AST Premium 2000
Service Guide

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Preface

What This Guide Contains

This guide contains information about performing service tasks that require the removal of the server covers. Any such task requires a trained service technician.

Who Should Read This Guide

This guide is written for the person trained to service the server hardware.

Warnings and Cautions

Refer to Appendix B for important safety information before beginning any service task.

Conventions Used in This Guide

The following conventions are used throughout this guide:

- Acronyms are spelled out on first mention with the acronym in parentheses. Example: Small Computer System Interface (SCSI). Thereafter, the acronym is used throughout the guide.
- Operator input appears in **boldface** type.
- Menu selections are indicated by the > symbol. Example: The security screen is displayed by selecting **Advanced Menu>Setup>Security**. The symbol > indicates a sub-menu item.
- Book titles, directory names, file names, and variables appear in *italic* type.
- Numbered lists denote operations that must be performed in a specific order. Bulleted lists do not denote specific order.
- Text prefaced with the word **Note** indicates important information that might be overlooked or ignored.
- Text prefaced with the word **CAUTION** specifies actions that could result in the software's loss of integrity or failure.
- Text prefaced with the word **WARNING** specifies actions or conditions that could lead to serious bodily harm.

Documentation

The *Platform and Documentation CD-ROM* contains all related server documentation. The following guides are included in *.pdf* file format:

Title	Description
Product Guide	Contains information on the server architecture and operation.
Service Guide	Contains information on performing service tasks that require the removal of the server covers.
Site Preparation and Hardware Installation Guide	Contains site preparation and hardware installation instructions for the server.

Working Inside the System

This chapter contains procedures for installing and removing the server covers, expansion boards, removable-media drives, hard disk drives, and fans.

Note: For the locations of the components referenced in this chapter, refer to Figure 1-1 in Chapter 1 of the *Product Guide*.

Tools and Supplies Needed

- Phillips (cross-head) screwdriver (#1 and #2 bit)
- Small flat-bladed screwdriver
- Jumper removal tool or needle-nosed pliers
- Anti-static wrist strap and conductive foam pad (recommended)
- Pen or pencil

Safety: Before You Remove the Side Cover

Before removing the side cover at any time, observe these safety guidelines:

1. Turn off all peripheral devices connected to the system.
2. Turn off the system by pressing the push-button power switch on the front of the server.
3. Unplug the AC power cord from the system or wall outlet.
4. Label and disconnect all peripheral cables and all telecommunication lines connected to I/O connectors or ports on the back of the system.
5. Provide some electrostatic discharge (ESD) protection by wearing an anti-static wrist strap attached to the chassis ground—any unpainted metal surface on the system—when handling components.

Warnings and Cautions

The following warnings and cautions apply throughout this manual to any procedure during which you remove the side and/or front cover(s) of the system.

WARNING: System power on/off: The push-button power switch on the front panel DOES NOT turn off the system AC power. To remove power from the system, you must unplug the AC power cord from the system or wall outlet.

WARNING: Hazardous conditions, power supply: Hazardous voltage, current, and energy levels are present inside the power supply. There are no user-serviceable parts inside it; only technically qualified personnel should do any servicing on the power supply.

WARNING: Hazardous conditions, devices, and cables: Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the system and disconnect the AC power cord, telecommunications systems, networks, and modems attached to the system before opening it. Otherwise, personal injury or equipment damage can result.

CAUTION: Electrostatic discharge (ESD) and ESD protection: ESD can damage disk drives, boards, and other components. We recommend that you perform all procedures in this chapter only at an ESD-protected workstation. If one is not available, provide some ESD protection by wearing an anti-static wrist strap attached to the chassis ground—any unpainted metal surface on the system—when handling components.

CAUTION: ESD and handling boards: Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges. After removing a board from its protective wrapper or from the system, place it component-side UP on a grounded, static-free surface. Use a conductive foam pad if available, but NOT the board wrapper. If you place the system board on a conductive surface, the battery leads may short out. If they do, the battery charge is drained, resulting in a loss of CMOS (Complementary Metal Oxide Semiconductor) data. Do not slide any boards across any surfaces.

Side and Front Covers

Removing the Side Cover

You need to remove the side cover, and, in some cases, the front cover, to reach components inside the system. When facing the front of the server, the side cover is on the left.

To remove the side cover, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter.

2. Turn off all peripheral devices connected to the system.

3. Turn off the system by pressing the push-button power switch on the front panel AND unplugging the AC power cord from the system or wall outlet.

4. Label and disconnect all peripheral cables attached to the I/O panel on the back of the system.

5. If there is a padlock installed on the back of the system, unlock and remove it. Refer to Figure 1-1 for the location of the padlock, if one is installed on the system.

6. Remove and save the retaining screws on the back of the side cover.

7. Using an even pull, slide the cover backward, about an inch, until it stops.

8. Using your left hand, pull the back end of the cover toward you to disengage its bottom row of tabs from the slots in the chassis.

9. Using both hands, lift the cover upward to disengage the top row of tabs from the slots in the top edge of the chassis. Set the cover aside.

Figure 1-1. Removing the Side Cover
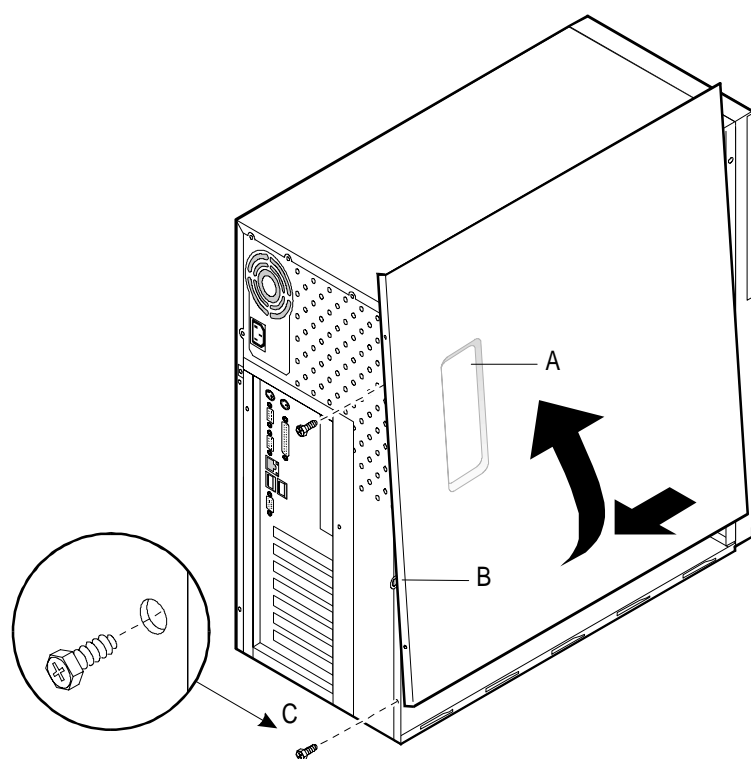
A	Built-in handle
B	Metal loop for padlock
C	Retaining screws

Reattaching the Side Cover

CAUTION: When you reattach the side cover, do not damage the electromagnetic interference (EMI) gaskets mounted on the cover. Replace any damaged strips; otherwise, the system may not meet EMI requirements.

To reattach the side cover, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter.

2. Before reattaching the cover, check that you have not left any tools or loose parts inside the system.

3. Check that cables, expansion boards, and other components are properly installed.

4. Position the cover over the chassis so that the top row of tabs aligns with the slots in the top of the chassis. Slide the cover toward the front of the system until the cover tabs firmly engage in the chassis.

5. Attach the cover to the chassis with the retaining screws you removed when you removed the cover, and tighten them firmly (6.0 inch-pounds).

6. To prevent unauthorized access inside the system, insert and lock a padlock through the metal loop protruding through the slot in the back of the side cover. Refer to Figure 1-1 for the location of the padlock loop.

7. Connect all external cables and the AC power cord.

Removing the Front Cover

Figure 1-2. Removing the Front Cover
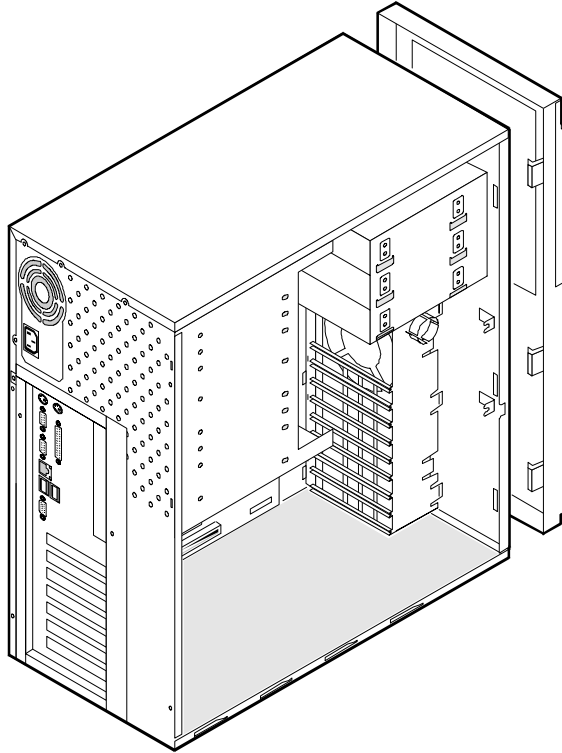
To remove the front cover, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter.

2. Remove the side cover, referring to "Removing the Side Cover" for instructions.

3. Squeeze the three plastic tabs inside the front cover, and push them through the chassis slots.

4. Pull the left side of the cover out slightly, about 15°, until the cover clears the push-button power switch.

5. Slide the cover to the right until the tabs disengage from the chassis slots. Set the cover aside.

Reattaching the Front Cover

To reattach the front cover, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter.

2. Before reattaching the front cover, check that you have not left any tools or loose parts inside the system.

3. Insert the plastic tabs on the front cover into the slots on the right of the chassis.

4. Squeeze the front panel and chassis together along the left side until the plastic tabs snap into their slots.

5. Reattach the side cover, referring to "Reattaching the Side Cover" for instructions.

Expansion Boards

The system board has one full-length dedicated ISA slot, which can contain a bus master. The ISA features include:

- Bus speed up to 8.33 MHz
- 16-bit memory addressing
- Type A transfers at 5.33 Mbps
- Type B transfers at 8 Mbps
- 8 or 16-bit data transfers
- Plug-and Play-ready

The system board has four full-length PCI-33 connectors. The PCI-33 features include:

- Bus speed up to 33 MHz
- 32-bit memory addressing
- 5V signaling environment
- Burst transfers up to 133 Mbps
- 8, 16, or 32-bit data transfers
- Plug-and-Play ready
- Parity enabled

The system board also has two full-length PCI-66 universal connectors (5 volt). Boards designed for the 3.3-volt connector do not fit. The PCI-66 features include:

- Bus speed up to 66 MHz
- 32-bit memory addressing
- 5V signaling environment
- Burst transfers up to 266 Mbps
- 8, 16, or 32-bit data transfers
- Plug-and-Play ready
- Parity enabled

Note: If you install a PCI-33 board into one of the PCI-66 slots, the bus speed for both of the PCI-66 slots is lowered to 33 MHz.

Note: The components on some full-length expansion boards installed in Slot 6 may interfere with the DIMM connector latches.

CAUTION: Accessory/option board outputs may exceed National Electric Code (NEC) Class 2 or limited power source limits, and must be installed with the appropriate interconnecting cabling in accordance with the NEC.

Installing an Expansion Board

CAUTION: Do not overload the system board: Do not overload the system board by installing expansion boards that draw excessive current.

CAUTION: ESD and handling boards: Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges. After removing a board from its protective wrapper or from the system, place it component-side UP on a grounded, static-free surface. Use a conductive foam pad if available, but NOT the board wrapper. If you place the system board on a conductive surface, the battery leads may short out. If they do, the battery charge is drained, resulting in a loss of CMOS data. Do not slide any boards across any surfaces.

To install an expansion board, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter.

2. Remove the side cover, referring to "Removing the Side Cover" for instructions.

3. Remove and save the screw that attaches the expansion-slot cover to the chassis. Refer to Item A in Figure 1-3 for the location of this screw. Remove the expansion-slot cover and retain it for possible future use.

Figure 1-3. Installing an Expansion Board
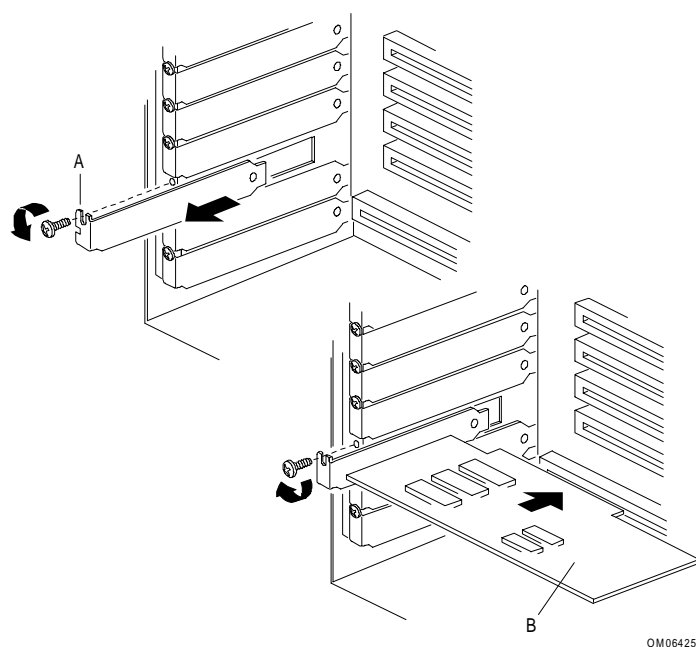
OM06425

A	Expansion-slot cover and screw
B	Expansion board; uses the same screw

4. Remove the expansion board you are installing from its protective wrapper. Be careful not to touch the components or gold edge connectors. Place the board component-side UP on an anti-static surface.

5. Set any jumpers and/or switches according to the board manufacturer's instructions.

6. Hold the board by its top edge or upper corners. Align the rounded notch in the board-retaining bracket with the threaded hole in the frame. The bracket fits the space formerly occupied by the slot cover you removed in Step 3. The tapered foot of the board-retaining bracket must fit into the mating slot in the expansion-slot frame. Firmly press the board into the slot on the system board.

7. Use the screw you removed in Step 3 to fasten the board to the chassis. Refer to Item B in Figure 1-3 for the location of this screw. Tighten the screw firmly (6.0 inch-pounds).

8. Attach any cables as necessary.

9. Reattach the side cover, referring to "Reattaching the Side Cover" for instructions.

Note: If you install an ISA board that is not Plug and Play, you must run the SSU to reconfigure the system. Running the SSU is optional for a PCI board. For information on running the SSU, see Chapter 4 of the *Product Guide*.

Removing an Expansion Board

CAUTION: Expansion-slot covers must be installed on all vacant expansion slots. This maintains the electromagnetic emissions characteristics of the system and ensures proper cooling of system components.

To remove an expansion board, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter.

2. Remove the side cover, referring to "Removing the Side Cover" for instructions.

3. Disconnect any cables attached to the board you are removing.

4. Remove and save the screw that attaches the board to the chassis. (Item B in Figure 1-3 shows the location of this screw.)

5. Holding the board by its top edge or upper corners, carefully pull it out. Do not scrape the board against other installed components.

6. Store the removed board in an anti-static protective wrapper.

7. If you are not installing a new board in the same slot, install an expansion-slot cover over the vacant expansion slot. The slot cover must fit into the mating slot in the expansion-slot frame.

8. Use the screw you removed in Step 4 to fasten the slot cover to the chassis. Item A in Figure 1-3 shows the location of this screw. Tighten the screw firmly (6.0 inch-pounds).

9. Reattach the side cover, referring to "Reattaching the Side Cover" for instructions.

Note: If you install an ISA board that is not Plug and Play, you must run the SSU to reconfigure the system. Running the SSU is optional for a PCI board. For information on running the SSU, see Chapter 4 of the *Product Guide*.

Diskette Drive

Removing a 3.5-inch Diskette Drive

To remove a 3-5 inch diskette drive, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter.

2. Remove the side cover, referring to "Removing the Side Cover" for instructions.

3. Disconnect the power and signal cables from the diskette drive. Refer to Figure 1-4 for the location of these cables.

4. Remove the screws that secure the drive bay inside the chassis. Then remove the screw that secures the drive carrier to the drive bay.

Figure 1-4. Removing the Drive Cables and Screw
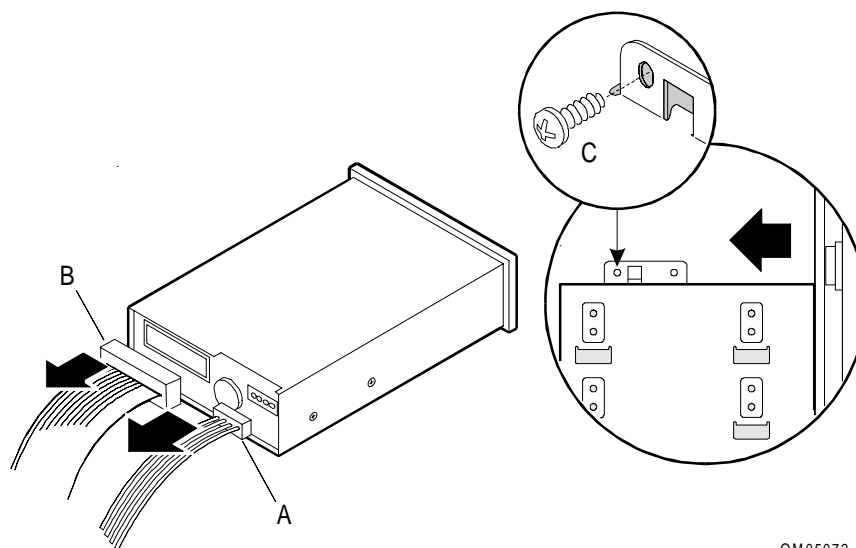
OM05072

A	Power cable
B	Signal cable
C	Chassis screw

5. Slide the drive assembly (drive and drive bracket) back toward the power supply to disengage the tabs from the slots in the bottom of the 5.25-inch drive bay.

6. Remove the drive assembly from the chassis, and place it component-side UP on an anti-static surface.

7. Referring to Figure 1-5, remove the screws that hold the drive bracket to the drive, and set the screws and the drive bracket aside.

8. Store the removed drive in an anti-static protective wrapper.

9. Reattach the side cover, referring to "Reattaching the Side Cover" for instructions.

Figure 1-5. Removing the Diskette Drive from the Drive Bracket
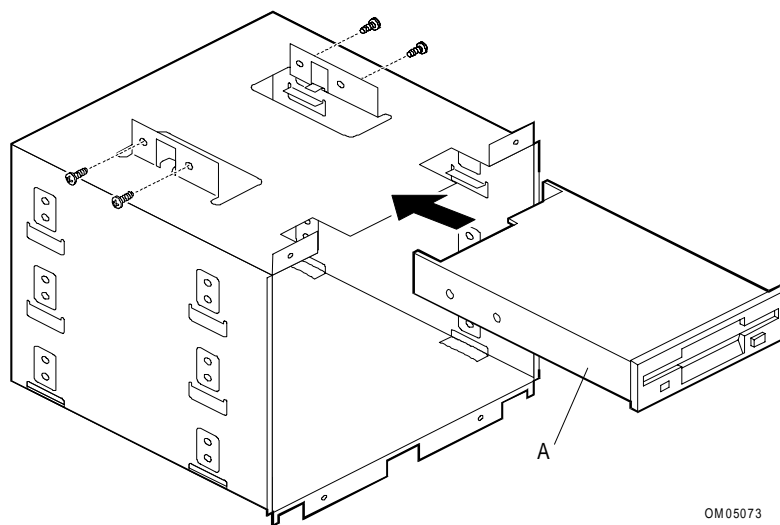
OM05073

Installing a 3.5-inch Diskette Drive

To install a 3.5-inch diskette drive, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter.

2. Remove the side cover, referring to "Removing the Side Cover" for instructions.

3. Remove the diskette drive you are installing from its protective wrapper, and place it component-side UP on an anti-static surface.

4. Set any jumpers and/or switches according to the drive manufacturer's instructions.

5. Place a drive bracket on the component-side of the drive, and align the four mounting holes. (Reuse the drive bracket you removed earlier, if you are performing this drive installation immediately after performing the previous "Removing a 3.5-inch Diskette Drive" procedure.)

6. Attach the drive bracket to the drive, using four screws of the appropriate size and length. (Reuse the screws you removed earlier, if you are performing this drive installation immediately after performing the previous "Removing a 3.5-inch Diskette Drive" procedure.) Tighten the screws firmly (between 4.0 and 6.0 inch-pounds).

7. Place the drive assembly into the front of the cabinet. Make sure the tabs are aligned. Slide the drive assembly toward the front of the system to engage the drive bracket tabs in the slots. Make sure the front of the drive fits correctly in the front opening of the system. When properly positioned, the drive carrier notches extend slightly into the interior of the 5.25-inch drive bay, and the threaded hole in the carrier aligns with the threaded hole in the frame.

8. Secure the drive assembly to the 5.25-inch bay with a screw of the appropriate size and length. (Reuse the screw you removed earlier, if you are performing this drive installation immediately after performing the previous "Removing a 3.5-inch Diskette Drive" procedure.) Tighten the screw firmly (6.0 inch-pounds).

9. Connect the signal and power cables to the drive. (Figure 1-4 shows the positioning of these cables.) The connectors are keyed for ease in reconnecting them to a drive. The red stripe on the signal cable must face toward the center of the drive.

10. Reattach the side cover, referring to "Reattaching the Side Cover" for instructions.

11. Run the SSU to reconfigure the system. For information on running the SSU, see Chapter 4 of the *Product Guide*.

Peripheral Devices

Device Cabling Considerations

This section summarizes drive cabling requirements and constraints for peripheral devices. The number of devices you can install depends on the following:

- The number supported by the bus
- The number of available bays
- The combination of SCSI and IDE devices

SCSI Requirements

The system can accommodate the following combinations of SCSI devices:

- The front bays can accommodate up to three 5.25-inch, half-height, removable-media devices; these devices may include diskette, tape, or CD-ROM drives.
- The internal bay can accommodate:
  - Up to four 3.5-inch, 1.6-inch high internal devices, or
  - Up to six 3.5-inch, 1-inch high internal devices

Note: The standard cable supplied with the system has connectors for three removable-media devices and four internal devices. Therefore, in order to configure the system with six internal devices, an optional SCSI adapter that supports six devices is required.

All SCSI devices must be un-terminated. Termination is installed at the end of the SCSI cable. We recommend that you install hard drives only in internal bays, which means you should route the SCSI cable so that the last device on the cable is a hard drive in an internal bay.

In general, the SCSI cable must be routed from the connector on the system board to the 5.25-inch SCSI devices in the external bays, and finally to the 3.5-inch SCSI devices in the internal bays.

Installing a 5.25-inch Removable-Media Device in a Front Bay

Three 5.25-inch, half-height front bays provide space for removable-media devices, such as diskette, tape, and CD-ROM drives.

CAUTION: Do not install hard drives in 5.25-inch bays: We recommend that you do NOT install hard drives in the 5.25-inch front bays because the drives cannot be properly cooled in this location. Also, hard drives generate EMI and are therefore more susceptible to ESD damage in this location.

Note: Save the filler panels and EMI shields: System cooling and EMI integrity are preserved when drives are installed in the front bays, or when filler panels and EMI shields cover the empty bays. Therefore, when you install a device, save the filler panel and EMI shield that you remove, so that you can reinstall them in the event you later remove the device and leave the bay empty.

Note: Bus termination when installing SCSI devices: It is important that your cabling and connections meet the SCSI bus specification. Otherwise, the bus may be unreliable and data corruption may occur, or devices may not work at all. The SCSI bus is terminated at the end of the cable.

To install a 5.25-inch removable-media device in a front bay, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter.

2. Remove the side and front covers, referring to "Removing the Side Cover" and "Removing the Front Cover" for instructions. Place the front cover on a flat surface.

3. Referring to Figure 1-6, remove the appropriate filler panel. Retain the filler panel for possible future use.

4. Referring to Figure 1-6, remove the appropriate EMI shield by rotating it until it separates from the cabinet. Retain the EMI shield for possible future use.

Peripheral Devices

Figure 1-6. Removing the Filler Panel and EMI Shield from the Front Cover

OM05085
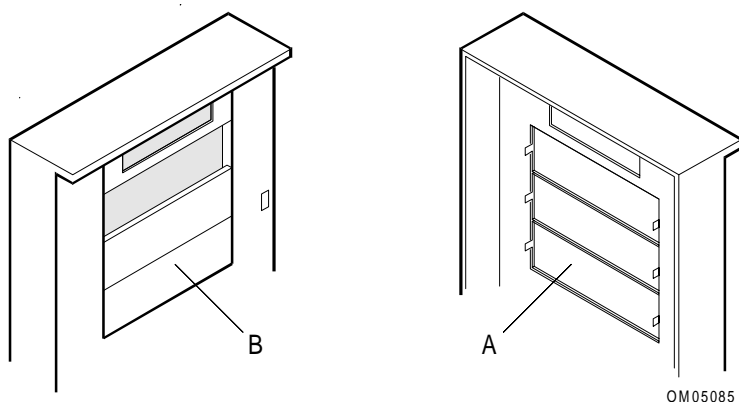
A	Filler panel
B	EMI shield

5. Remove the bay as described in "Removing a 3.5-inch Diskette Drive."

6. Remove the device you are installing from its protective wrapper, and place it on an anti-static surface.

7. Set any jumpers and/or switches according to the device manufacturer's instructions.

8. Specify a SCSI ID for the device, using the configuration jumpers on the device. Each SCSI device must be assigned a unique SCSI ID. (The SCSI controller on the system board is always set to SCSI ID 7.)

9. Install the device in the bay, using four screws of the appropriate size and length.

10. Referring to Figure 1-7, install the bay in the system cabinet.

11. Referring to Figure 1-7, connect a signal cable and a power cable to the device. The connectors are keyed and can be inserted in only one way.

12. Reattach the front and side covers, referring to "Reattaching the Front Cover" and "Reattaching the Side Cover" for instructions.

1-14   Working Inside the System

Figure 1-7. Installing a 5.25-inch Removable-Media Device
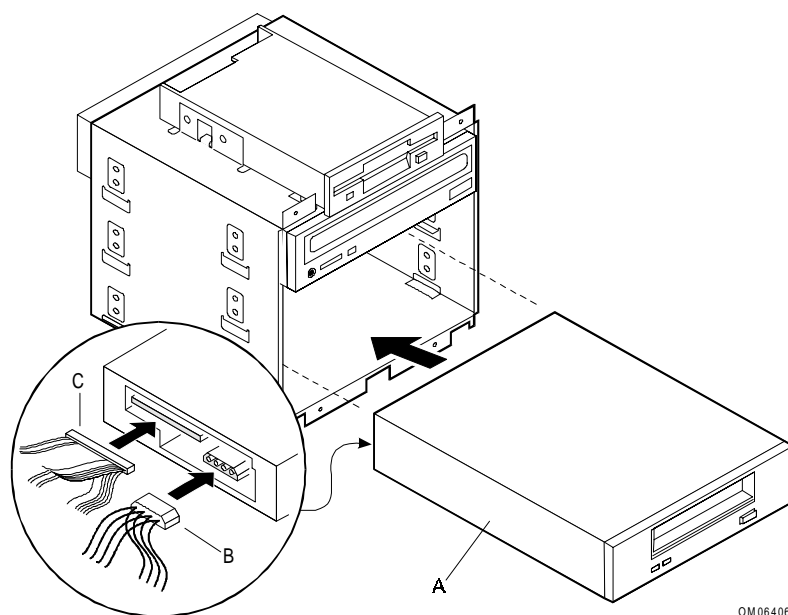
A	Removable-media device; diskette, tape, or CD-ROM drive
B	Power cable
C	Typical SCSI signal cable

13. Run the SSU to reconfigure the system. For information on running the SSU, see Chapter 4 of the *Product Guide*.

Note: If you have an expansion host adapter board in your system, you may need to run the SSU to set the hard disk drive options to "Not Installed" and the Onboard IDE option to "Disabled." For information on running the SSU, see Chapter 4 of the *Product Guide*.

Removing a 5.25-inch Removable-Media Device from a Front Bay

To remove a 5.25-inch removable-media device from a front bay, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter.

2. Remove the side and front covers, referring to "Removing the Side Cover" and "Removing the Front Cover" for instructions.

3. Disconnect the power and signal cables from the device.

4. Remove the device bay from the cabinet.

5. Remove and save the four screws that secure the device to the bay.

6. Reinstall the bay inside the cabinet.

7. If you are not installing a device in the now-vacant bay, install a filler panel and an EMI shield on the front cover of the system to cover the opening of the vacant bay.

8. Store the removed device in an anti-static protective wrapper.

9. Reattach the front and side covers, referring to "Reattaching the Front Cover" and "Reattaching the Side Cover" for instructions.

Installing a SCSI Device in an Internal Bay

Note: If you install a SCSI cable other than the one supplied with the system, you must provide active SCSI bus termination at the end of the cable. Leaving the cable installed without active termination violates the SCSI bus specification and causes the SCSI bus to be unreliable.

Note: Ensure that termination is removed or disabled on all SCSI devices other than the last one on the SCSI bus.

To install a SCSI device in an internal bay, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter. See also the cabling considerations in "Device Cabling Considerations."

2. Remove the side cover, referring to "Removing the Side Cover" for instructions.

3. Disconnect the SCSI signal cable from the connector on the system board.

4. Disconnect the power and signal cables from all the devices installed in the bay.

5. Remove and save the four screws holding the crossbar and bay to the chassis.

6. Slide the bay upward to disengage its tabs from the chassis.

7. Remove the bay from the system cabinet and place it on an anti-static surface.

8. Remove the device you are installing from its protective wrapper, and place it on an anti-static surface.

9. Set any jumpers and/or switches according to the device manufacturer's instructions.

10. Specify a SCSI ID for the device, using the configuration jumpers on the device. Each SCSI device must be assigned a unique SCSI ID. (The SCSI controller on the system board is always set to SCSI ID 7.)

11. Install the device in the bay, using screws of the appropriate size and length.

12. Reinstall the bay in the chassis. Insert the tabs on the bay into their slots in the chassis. Slide the bay downward until the tabs interlock with the slots.

13. Referring to Figure 1-8, secure the bay to the chassis with the four screws you removed in Step 5. Tighten the screws firmly (6.0 inch-pounds).

Figure 1-8. Securing the Bay to the Chassis
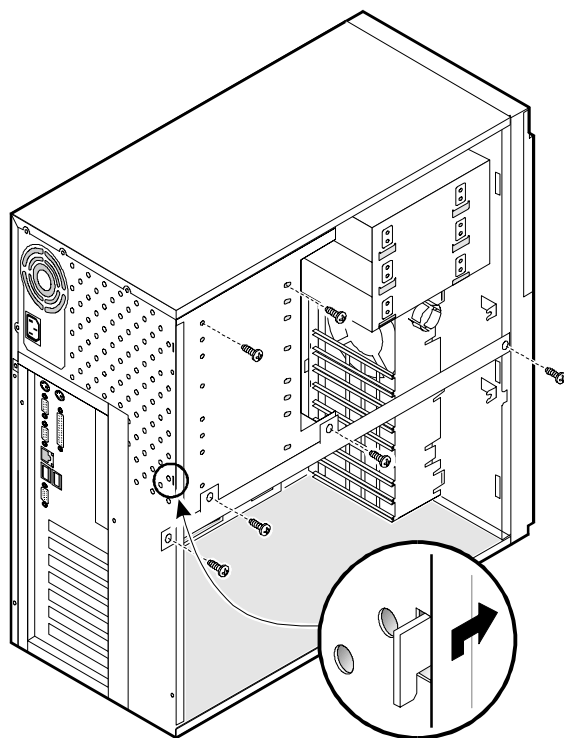
14. Reattach the signal and power cables to all the devices installed in the bay.

15. Reconnect the SCSI signal cable to the connector on the system board.

16. For proper cooling and airflow, neatly fold and secure any excess signal cable (using a tie wrap or cable clip) so that it does not drape across the system board or expansion boards.

17. Reattach the side cover, referring to "Reattaching the Side Cover" for instructions.

18. This step is optional: Run the SCSI*Select* utility to configure the SCSI devices installed on the system. For information on running the SCSI*Select* utility, see Chapter 5 of the *Product Guide*.

Note: If you have a RAID adapter, you must configure and initialize the new SCSI device by running the RAID utility that matches your adapter. Refer to Chapter 5 of the *Product Guide* for more information on running these RAID utilities.

Removing a SCSI Device from an Internal Bay

To remove a SCSI device from an internal bay, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter.

2. Remove the side cover, referring to "Removing the Side Cover" for instructions.

3. Disconnect the SCSI signal cable from the connector on the system board.

4. Disconnect the power and signal cables from all the devices installed in the bay.

5. Remove and save the four screws holding the crossbar and bay to the chassis.

6. Slide the bay upward to disengage its tabs from the chassis.

7. Remove the bay from the system cabinet and place it on an anti-static surface.

8. Remove the screws that attach the device to the bay.

9. Remove the device from the bay and store it in an anti-static protective wrapper.

10. Reinstall the bay in the system cabinet. Insert the tabs on the bay into their slots in the chassis. Slide the bay downward until the tabs interlock with the slots.

11. Referring to Figure 1-8, secure the bay to the chassis with the four screws you removed in Step 5. Tighten the screws firmly (6.0 inch-pounds).

12. Reattach the signal and power cables to all the devices installed in the bay.

13. Reconnect the SCSI signal cable to the connector on the system board.

14. For proper cooling and airflow, neatly fold and secure any excess signal cable (using a tie wrap or cable clip) so that it does not drape across the system board or expansion boards.

15. Reattach the side cover, referring to "Reattaching the Side Cover" for instructions.

Fans

For cooling and airflow, the system contains one or more removable chassis fans to cool the internal components. The integrated power supply fan provides additional cooling and airflow.

The procedures in this section describe the removal and installation of chassis fans.

Removing a Chassis Fan

To remove a chassis fan, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter.

2. Remove the side and front covers, referring to "Removing the Side Cover" and "Removing the Front Cover" for instructions.

3. Label and disconnect any cables that are connected to the expansion boards.

4. Remove all the expansion boards. As you remove each board, label it with its slot number so that you can reinstall it in the same slot.

5. Disconnect the fan power cable connector from the fan header on the system board.

6. Remove the plastic, snap-on fan housing assembly by firmly pressing inward on the plastic tabs on the assembly until you can pull the front tabs out of the slots in the chassis.

7. Swing the assembly to the left until you can disengage the plastic tabs on the back side of the assembly from the slots in the chassis.

Figure 1-9. Removing the Fan Housing Assembly
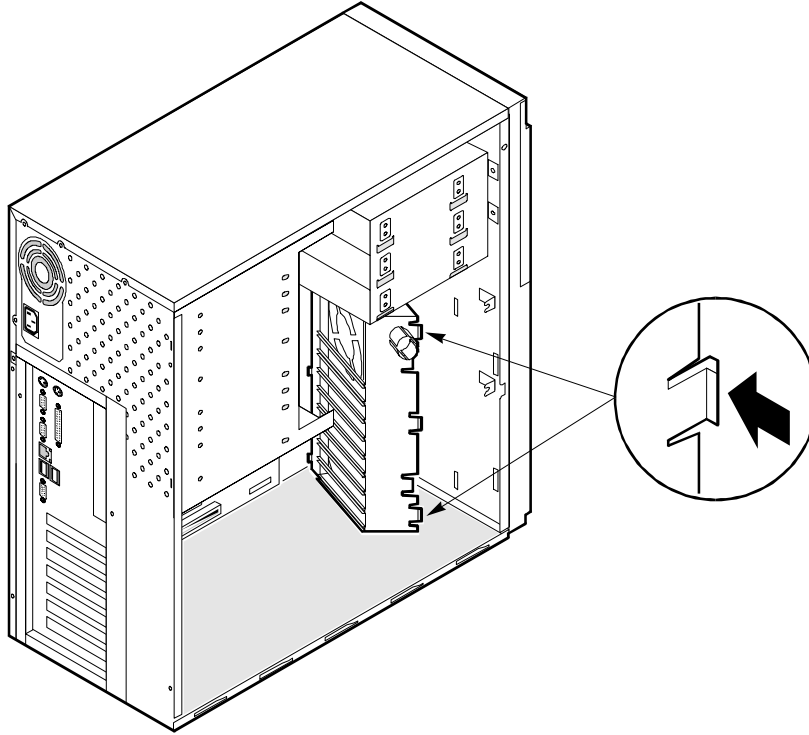
8. Remove the assembly from the chassis and place it on a flat surface.

9. Unsnap the fan from the housing by pressing outward on the plastic tabs that hold the fan in place. Remove the fan from the housing and set it aside.

10. Proceed directly to the following "Installing a Chassis Fan" procedure to install a new fan and reinstall all the components you removed during this procedure.

Installing a Chassis Fan

Note: The chassis fan pulls air from in front of the chassis so that it flows across the boards and out the back of the cabinet. Thus, the fan must be oriented for the correct airflow direction. If you place the fan so that the label faces the back of the chassis, this should provide the correct orientation. You can confirm this by checking the following embossed arrows on the side of the fan as you place it in its bracket:

- ⇒ Arrow points horizontally toward the back of chassis
- ⇑ Arrow points vertically upward

CAUTION: Replace a failed fan with the same type as the one you removed, with a tachometer signal, or an approved fan. For details about the fan connector, see "Fan Interface Connectors" in Chapter 4. For more information on replacing a fan, contact your customer service representative.

Figure 1-10. Installing a Chassis Fan

Fan cable is routed
though cutout
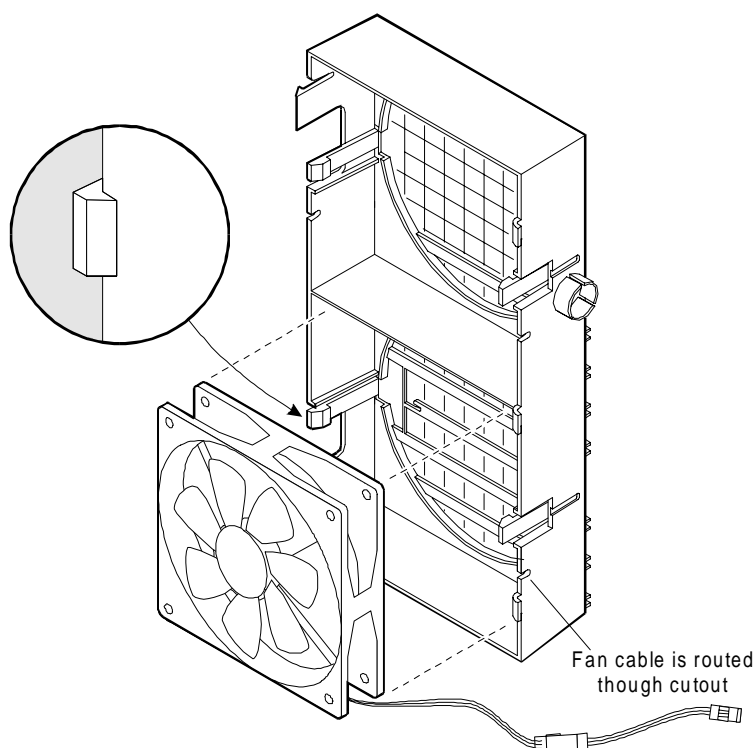
Note: The following procedure assumes that you have just removed a chassis fan by completing the steps in the previous "Removing a Chassis Fan" procedure.

To install a chassis fan, follow these steps:

1. Position the cable-side of the fan, with the label-side facing the board guides, over the plastic guide posts in the fan housing.

2. Thread the fan power cable through the opening on the side of the housing, as shown in Figure 1-10. Do not pinch the cable as you snap the fan into the housing.

3. Insert the assembly's inner-edge plastic tabs, the ones near the fan cable, into the slots in the chassis.

4. Carefully swing the assembly to the right, as if closing a door, until the outer-edge tabs on the fan housing snap into the slots in the front of the chassis. To align these tabs correctly, you may need to repeat Step 1.

5. Reconnect the fan power cable connector to the fan header on the system board. (A fan in the bottom of the housing connects to the Fan 1 header; a fan in the top of the housing connects to the Fan 0 header.)

6. Reinstall all the expansion boards, each into the slot from which it was removed.

7. Reconnect any cables to the expansion boards from which they were removed.

8. Reattach the front and side covers, referring to "Reattaching the Front Cover" and "Reattaching the Side Cover" for instructions.

Upgrading System Board Components

This chapter provides procedures for installing and removing the system board, DIMMs, and processors, and the procedure for replacing the battery. It also shows the locations of the system board jumpers, describes their settings, and provides procedures for changing their settings.

Note: For the system board locations of the connectors, slots, and processors referenced in this chapter, refer to Figure 4-1 in Chapter 4.

Tools and Supplies Needed

- Phillips (cross-head) screwdriver (#1 and #2 bit)
- Small flat-bladed screwdriver
- Jumper removal tool or needle-nosed pliers
- Anti-static wrist strap and conductive foam pad (recommended)
- Pen or pencil

Warnings and Cautions

The following warnings and cautions apply throughout this manual to any procedure during which you remove the side and/or front cover(s) of the system.

WARNING: System power on/off: The push-button power switch on the front panel DOES NOT turn off the system AC power. To remove power from the system, you must unplug the AC power cord from the system or wall outlet.

WARNING: Hazardous conditions, power supply: Hazardous voltage, current, and energy levels are present inside the power supply. There are no user-serviceable parts inside it; only technically qualified personnel should do any servicing on the power supply.

WARNING: Hazardous conditions, devices, and cables: Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the system and disconnect the AC power cord, telecommunications systems, networks, and modems attached to the system before opening it. Otherwise, personal injury or equipment damage can result.

CAUTION: Electrostatic discharge (ESD) and ESD protection: ESD can damage disk drives, boards, and other components. We recommend that you perform all procedures in this chapter only at an ESD-protected workstation. If one is not available, provide some ESD protection by wearing an anti-static wrist strap attached to the chassis ground—any unpainted metal surface on the system—when handling components.

CAUTION: ESD and handling boards: Always handle boards carefully. They can be extremely sensitive to ESD. Hold boards only by their edges. After removing a board from its protective wrapper or from the system, place it component-side UP on a grounded, static-free surface. Use a conductive foam pad if available, but NOT the board wrapper. If you place the system board on a conductive surface, the battery leads may short out. If they do, the battery charge is drained, resulting in a loss of CMOS data. Do not slide any boards across any surfaces.

CAUTION: Installing or removing jumpers: A jumper is a small, plastic-encased conductor that slips over two jumper pins. Newer jumpers have a small tab on top that you can grip with your fingertips or with a pair of fine, needle-nosed pliers. If your jumpers do not have such a tab, take care when using needle-nosed pliers to remove or install a jumper; grip the narrow sides of the jumper with the pliers, never the wide sides. Gripping the wide sides can damage the contacts inside the jumper, causing intermittent problems with the function controlled by that jumper. Take care to gently grip, but not squeeze, with the pliers or other tool that you use to remove a jumper. Otherwise, you may bend or break the stake pins on the board.

System Board

Removing the System Board

CAUTION: The system board can be extremely sensitive to ESD, and always requires careful handling. After removing it from the system, place it component-side UP on a grounded, static-free surface to prevent the battery leads from shorting out. If you place the board on a conductive surface, the battery leads may short out. If they do, the battery charge is drained, resulting in a loss of CMOS data. Do not slide the system board across any surface.

To remove the system board, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter.

2. Remove the side cover, referring to "Removing the Side Cover" in Chapter 1 for instructions.

3. Label and disconnect any cables that are connected to the expansion boards.

4. Remove all the expansion boards. As you remove each board, label it with its slot number so that you can reinstall it in the same slot.

5. Label and disconnect all the internal cables that are connected to the system board.

6. Remove the fan housing assembly, referring to "Removing a Chassis Fan" in Chapter 1 for instructions.

7. Referring to Figure 2-1, remove the system board retaining screws and set them aside.

8. Pull the board toward you slightly, and slide it carefully toward the front of the server cabinet until its I/O connectors clear the rear of the chassis.

9. Remove the system board, and place it component-side UP on a grounded, static-free surface or in an anti-static bag.

    CAUTION: If you place the board on a conductive surface, the battery leads may short out. If they do, the battery charge is drained, resulting in a loss of CMOS data.

10. Remove the EMI gasket that covers the I/O connectors on the board, and set it aside.

11. Proceed directly to the following "Installing the System Board" procedure to (1) install a new system board, or reinstall the existing system board (after performing whatever work you need to do while the system board is removed); then (2) reinstall all the components you removed during this procedure

Figure 2-1. Removing the System Board
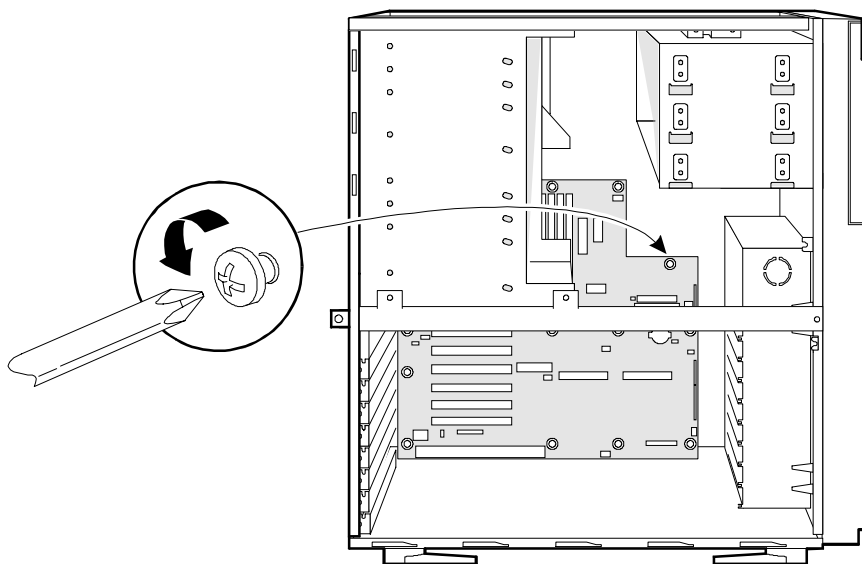
Installing the System Board

Note: The following procedure assumes that you have just removed the system board by completing the steps in the previous procedure, "Removing the System Board."

To install the system board, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter.

2. Replace the EMI gasket to cover the I/O connectors on the system board.

3. Position the board over the threaded standoffs inside the chassis. Slide it carefully toward the rear of the server cabinet until the I/O connectors protrude through the back panel.

4. Referring to Figure 2-1, insert one retaining screw through one of the mounting holes of the board and into a threaded standoff. Do not tighten the screw until the next step.

5. Insert the remaining screws through the mounting holes of the board and into the threaded standoffs. Make sure the board is properly seated; then tighten all the screws firmly (6.0 inch-pounds).

6. Reinstall the fan housing assembly, referring to "Installing a Chassis Fan" in Chapter 1 for instructions.

7. Reconnect all the internal cables to the system board.

8. Reinstall all the expansion boards, each into the slot from which it was removed.

9. Reconnect any cables to the expansion boards from which they were removed.

10. Reattach the side cover, referring to "Reattaching the Side Cover" in Chapter 1 for instructions.

11. Run the SSU to reconfigure the system. For information on running the SSU, see Chapter 4 of the *Product Guide*.

DIMMs

Installing DIMMs

CAUTION: Use extreme care when installing a DIMM. Applying too much pressure can damage the socket. DIMMs are keyed and can be inserted in only one way.

CAUTION: Mixing dissimilar metals may cause later memory failures, resulting in data corruption. Install DIMMs that have gold-plated edge connectors only in gold-plated sockets.

The server supports from 64 MB to 2 GB of memory, using up to four double-banked DIMMs.

Figure 2-2. Installing DIMMs

DIMM sockets
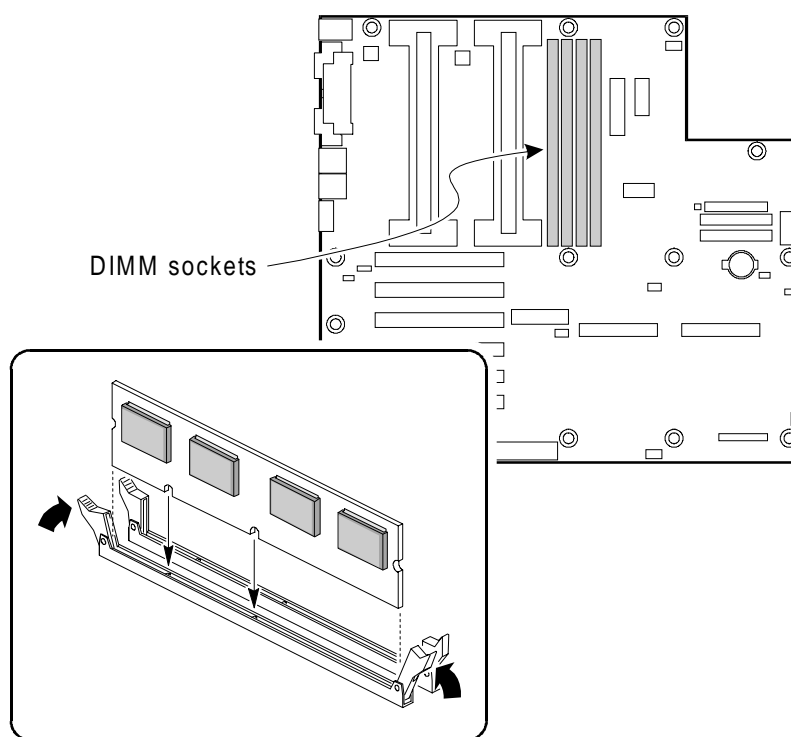
To install DIMMs, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter, and the cautions at the beginning of this section.

2. Remove the side cover, referring to "Removing the Side Cover" in Chapter 1 for instructions.

3. Holding the DIMM only by its edges, remove it from its anti-static package.

4. Referring to Figure 2-2, orient the DIMM so that the two notches in the bottom edge of the DIMM align with the keyed socket.

5. Insert the bottom edge of the DIMM into the socket, and press down firmly on the DIMM until it seats correctly.

6. Gently push the plastic ejector levers on the socket ends to the upright position.

7. Repeat Steps 3–6 to install each DIMM.

8. Reattach the side cover, referring to "Reattaching the Side Cover" in Chapter 1 for instructions.

9. Run the SSU to reconfigure the system after adding Error Correcting Code (ECC) memory. For information on running the SSU, see Chapter 4 of the *Product Guide*.

Note: Make sure you run the SSU and reconfigure the system. Failure to do so may degrade the performance of the server.

Removing DIMMs

CAUTION: Use extreme care when removing a DIMM. Applying too much pressure can damage the socket. Apply only enough pressure on the plastic ejector levers to release the DIMM.

To remove DIMMs, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter, and the caution at the beginning of this section.

2. Remove the side cover, referring to "Removing the Side Cover" in Chapter 1 for instructions.

3. Gently push the plastic ejector levers out and down to eject a DIMM from its socket.

4. Hold the DIMM only by its edges, being careful not to touch its components or gold edge connectors. Carefully lift it away from the socket, and store it in an anti-static package.

5. Repeat Steps 3 and 4 to remove other DIMMs, as necessary.

6. Reattach the side cover, referring to "Reattaching the Side Cover" in Chapter 1 for instructions.

7. Run the SSU to reconfigure the system after removing ECC memory. For information on running the SSU, see Chapter 4 of the *Product Guide*.

Processors

WARNING: If the system has been running, any installed processor and heat sink on the processor board(s) are hot. To avoid the possibility of a burn, be careful when removing or installing system board components that are located near processors.

CAUTION: Processor must be appropriate: You may damage your system if you install a processor that is inappropriate for it. Make sure your system can handle a newer, faster processor (thermal and power considerations). For exact information about processor interchangeability, contact your customer service representative.

CAUTION: Heat sink must be appropriate: Depending on your configuration, the existing processor may have a passive heat sink. If you REPLACE the processor with a faster one, it must have a fan heat sink (a powered fan instead of a passive heat sink). If you ADD a second processor, it must have a fan heat sink. When adding a processor, you must leave the existing processor in the primary connector (closest to the center of the system board).

CAUTION: ESD and handling processors: Reduce the risk of ESD damage to the processor by doing the following: (1) Touch the metal chassis of the system before touching the processor or system board. Keep part of your body in contact with the metal chassis to dissipate the static charge while handling the processor. (2) Avoid moving around unnecessarily.

Removing and Installing an SECC Cartridge Pentium II Processor

Removing a Pentium II Processor

Figure 2-3. Removing a Pentium II Processor
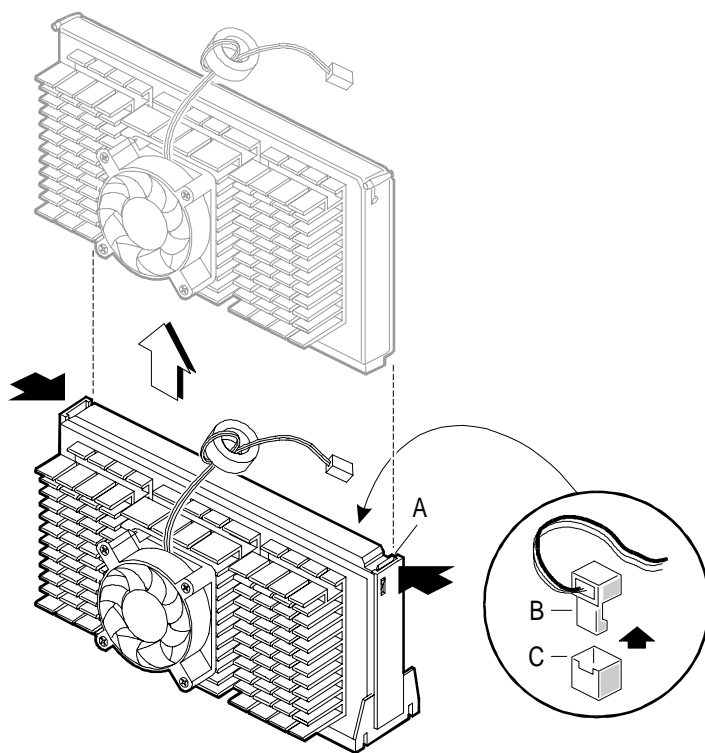
A	Retention module
B	Power wire
C	System board connector

CAUTION: Do not touch or bend the processor's exposed pins. Reduce the risk of ESD damage to the processor by doing the following:

- Touch the metal chassis of the system before touching the processor or system board. Keep part of your body in contact with the metal chassis to dissipate the static charge while handling the processor.

- Avoid moving around unnecessarily.

To remove a processor, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter and those at the beginning of this section.

2. Remove the side cover, referring to "Removing the Side Cover" in Chapter 1 for instructions.

3. Referring to Figure 2-3, disconnect the power wire from the connector on the system board.

4. Press the processor latches toward the center of the processor cartridge to free them from the retention module. Refer to Figure 2-4 for the location of these latches.

5. Lift the processor cartridge upward, and out of the retention module, as indicated in Figure 2-3.

6. Place the processor cartridge in a piece of conductive foam and store it in an anti-static package.

7. Reattach the side cover, referring to "Reattaching the Side Cover" in Chapter 1 for instructions.

Installing a Pentium II Processor

Figure 2-4. Installing a Pentium II Processor
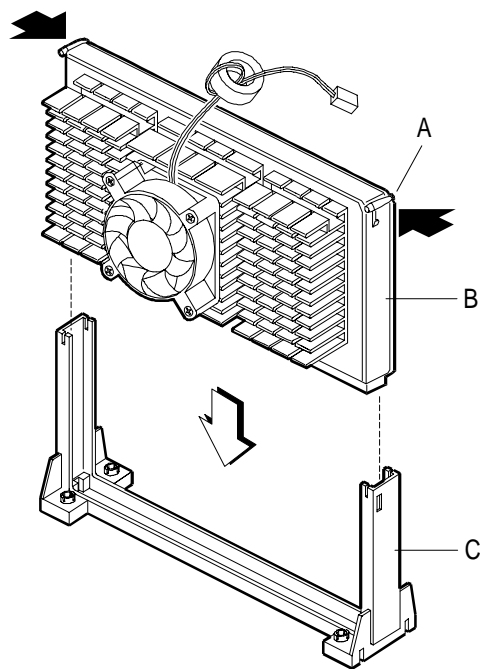
A	Processor latches
B	Processor cartridge
C	Retention module

CAUTION: Processor must be appropriate: You may damage your system if you install a processor that is inappropriate for it. Make sure your system can handle a newer, faster processor (thermal and power considerations). For exact information about processor interchangeability, contact your customer service representative.

CAUTION: Heat sink must be appropriate: Depending on your configuration, the existing processor may have a passive heat sink. If you REPLACE the processor with a faster one, it must have a fan heat sink (a powered fan instead of a passive heat sink). If you ADD a second processor, it must have a fan heat sink. When adding a processor, you must leave the existing processor in the primary connector (closest to the center of the system board).

CAUTION: Reduce the risk of ESD damage to the processor by doing the following:

- Touch the metal chassis of the system before touching the processor or system board. Keep part of your body in contact with the metal chassis of the system to dissipate the static charge while handling the processor.
- Avoid moving around unnecessarily.

To install a processor, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter and those at the beginning of this section.

2. Remove the side cover, referring to "Removing the Side Cover" in Chapter 1 for instructions.

3. If your system has one processor and you are REPLACING it, proceed to Step 6 now.

4. If your system has two processors and you are REPLACING one or both of them, proceed to Step 7 now.

5. If your system has one processor and you are ADDING a second one, remove the termination board from the empty Slot 1 secondary connector, referring to Figure 2-5. Press the tabs on the top of the termination board toward each other to release them from the retention module, as indicated by Item A in Figure 2-5. Lift the termination board up and out of the retention module, as indicated by Item B in Figure 2-5. Place the termination board in a piece of conductive foam and store it in an anti-static package. Then proceed directly to Step 8.

Figure 2-5. Removing the Termination Board from the Slot 1 Secondary Connector
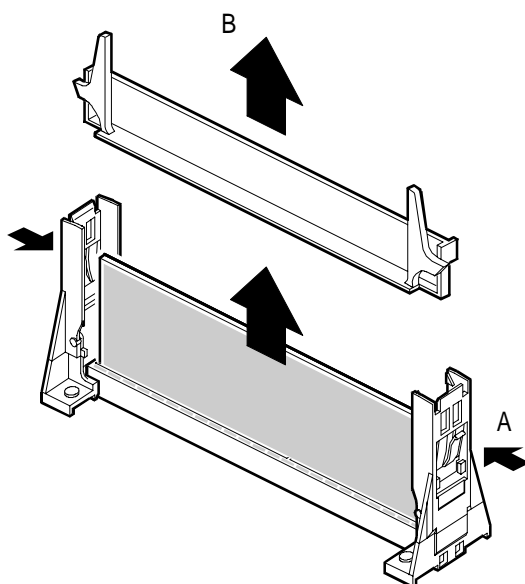
A	Pressing the tabs on the top of the termination board
B	Lifting the termination board up and out of the retention module

6. If your system has one processor and you are REPLACING it, remove the processor cartridge, referring to the previous "Removing a Pentium II Processor" procedure for instructions. Then proceed directly to Step 8.

7. If your system has two processors and you are REPLACING one or both of them, remove the appropriate processor cartridge(s), referring to the previous "Removing a Pentium II Processor" procedure for instructions.

8. Remove the new processor cartridge from its anti-static package and place it on a grounded, static-free surface or conductive foam pad.

9. Orient the processor cartridge so that the heat sink faces the center of the system board. Slide the processor cartridge into the retention module, as indicated in Figure 2-4.

10. Ensure that the alignment notch in the processor cartridge fits over the plug in Slot 1. Push down firmly, with even pressure on both sides of the top, until the processor cartridge is seated.

11. To lock in the processor cartridge, push the latches outward until they click into place in the retention module. Refer to Figure 2-6.

    CAUTION: The processor latches must be pushed outward until they click into the retention module. The latches must be secured for proper electrical connection of the processor.

12. Attach the small end of the power cable to the fan connector on the processor cartridge; then attach the large end to the three-pin connector on the system board, as indicated in Figure 2-6.

    CAUTION: The fan heat sink power cable must plug into the processor fan connector on the system board.

13. Reattach the side cover, referring to "Reattaching the Side Cover" in Chapter 1 for instructions.

14. Run the BIOS Setup Utility and specify the processor speed. For more information, refer to the discussion of the "CPU Speed Setting" option of the "Main Menu" section in Chapter 4 of the *Product Guide*.

Figure 2-6. Locking the Pentium II Processor into Place
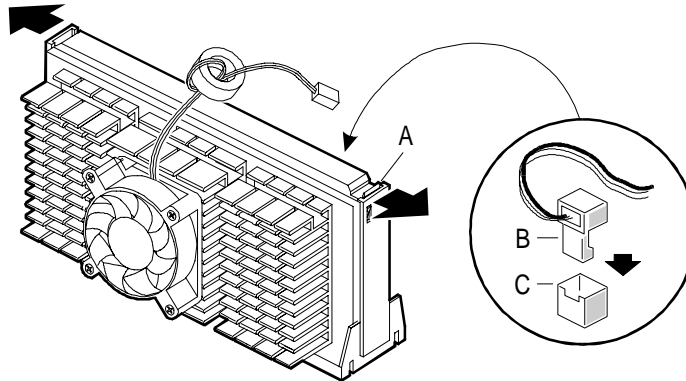
A	Retention module
B	Large end of the power cable
C	3-pin connector on the system board

Installing and Removing an SECC2 Cartridge Pentium II/III Processor

Note: You must install the fansink onto the SECC2 cartridge Pentium II/III processor before you install the processor module into the socket on the processor board.

Installing the Processor Fansink

To install the fansink to the SECC2 Pentium II/III processor module, follow these steps:

1. Remove the thermal tape protector at the back of the fansink.

Figure 2-7. Removing the Thermal Tape Protector
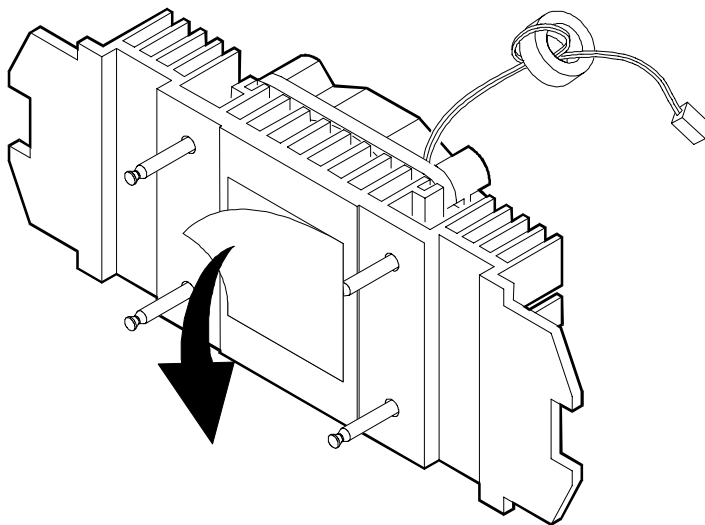
2. Turn the fansink over and lay it on a flat surface (fan side down, pins up).

3. Position the SECC2 cartridge holes over the fansink pins, lining up the pins with the holes in SECC2 cartridge. See the following figures.

Figure 2-8. Matching the Fansink Clips with the Processor Holes
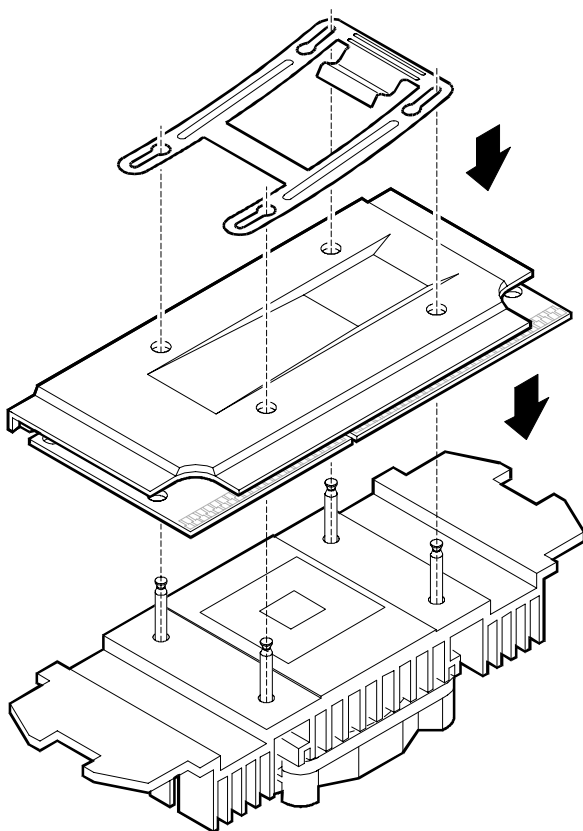
4. Attach the SECC2 cartridge to the fansink by gently pushing the SECC2 cartridge down onto the fansink.

5. Place the two left holes of the holddown clip on the two left protruding fansink pins, observing the "up" orientation on the clip. Slide the clip to the right.

6. Press down on the right side of the clip, aligning the two right holes of the clip with the two right fansink pins. While holding the right side of the clip down, slide the clip to the left to lock it into place. See the following figure.

Figure 2-9. Installing the Clip

UP
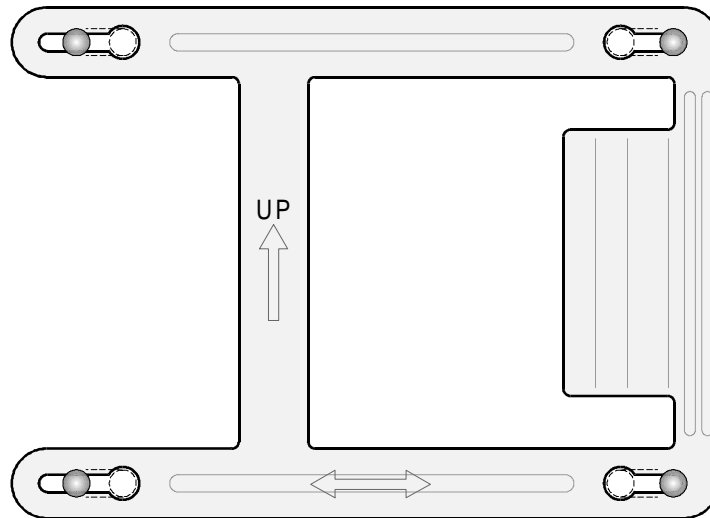
Place this side first over
pins and slide to the right.

Press down on the clip
placing this side over the pins
and slide to the left.

Installing the Processor Module on the Processor Board

To install the processor module on the processor board, follow these steps:

1. Place the retention mechanism over the processor socket on the processor board. Secure it with the screws that came with the package.

Figure 2-10. Installing the Retention Mechanism
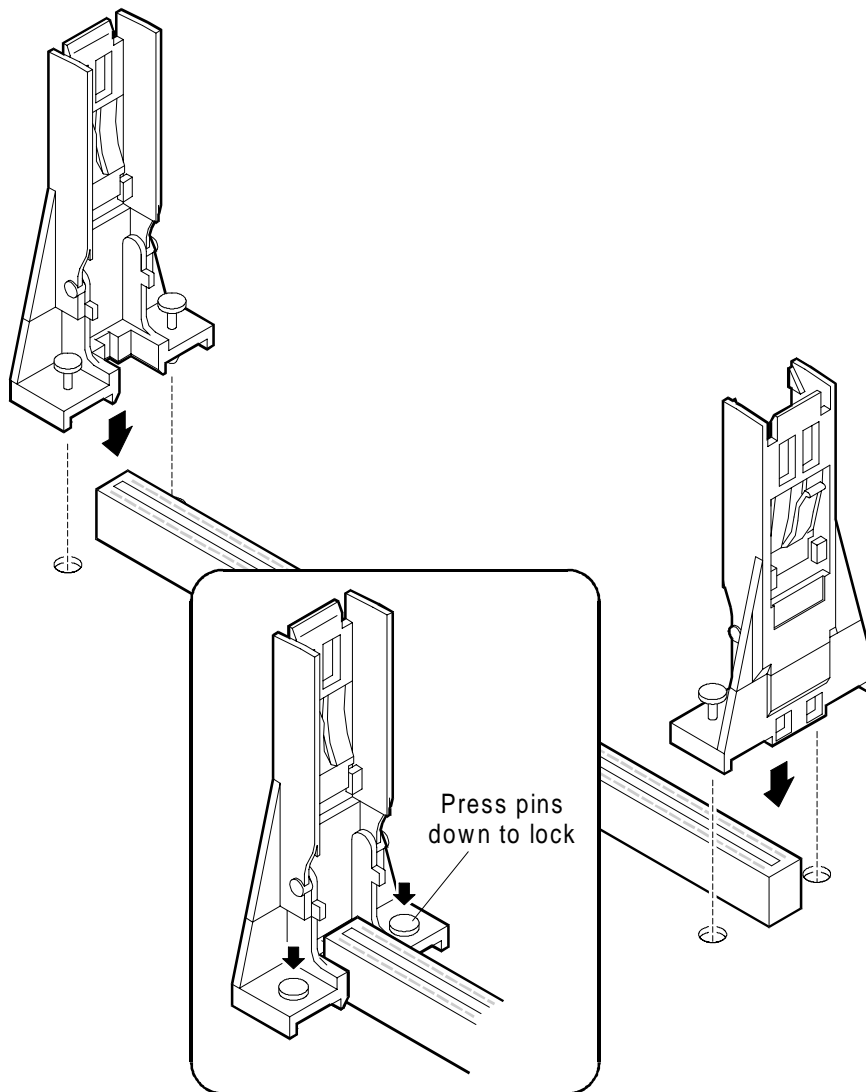
2. With the processor module golden fingers pointing downward, align the processor to the posts of the retention mechanism then lower it down. See the following figure.

Figure 2-11. Installing the Processor Module
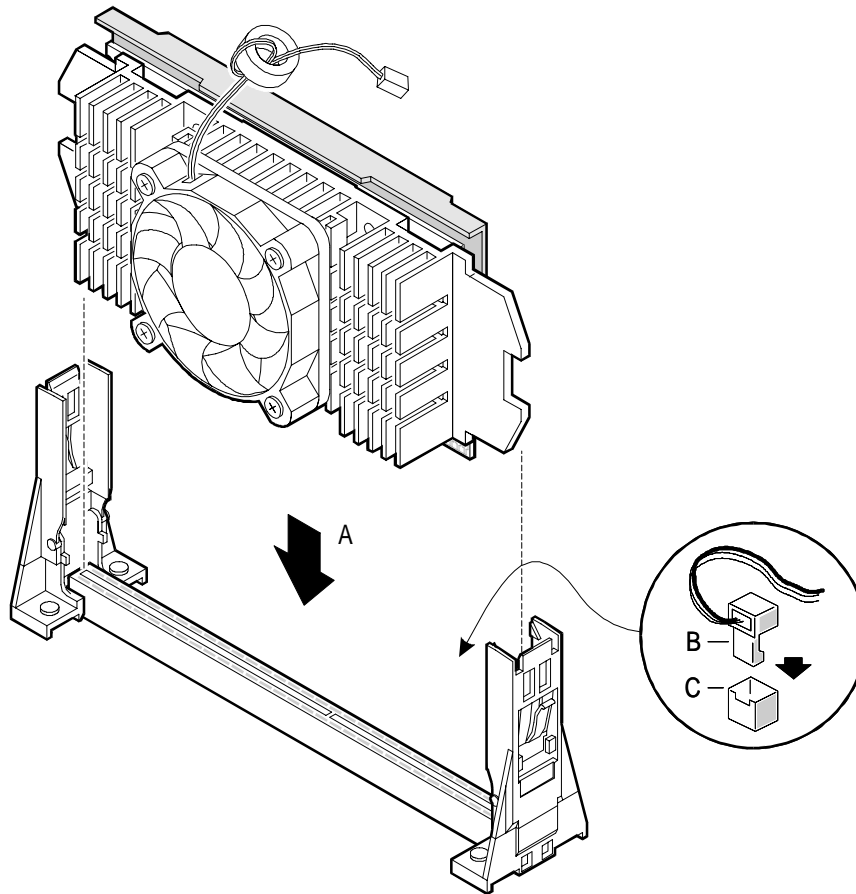
    Note: The golden fingers of the processor module are slotted such that they only fit in one direction. Ensure that the module grooves matches the ones on the processor socket.

3. Press down the processor module until the golden fingers completely fit into the socket.

4. Observe that the latches on the sides of the connectors snap into position to lock the processor module into place.

5. Locate the fan connectors on the system board and connect the fan cables.

Removing a Processor

To remove a processor, follow the procedures in this section.

Removing a Processor from the Processor Board Slot

To remove the processor module from the slot, follow these steps:

1. Detach the fan cables from the connectors on the system board.

2. Unlock the latches the secure that processor module.

3. Firmly hold the processor module and pull it out of the socket.

Figure 2-12. Removing the Processor Module
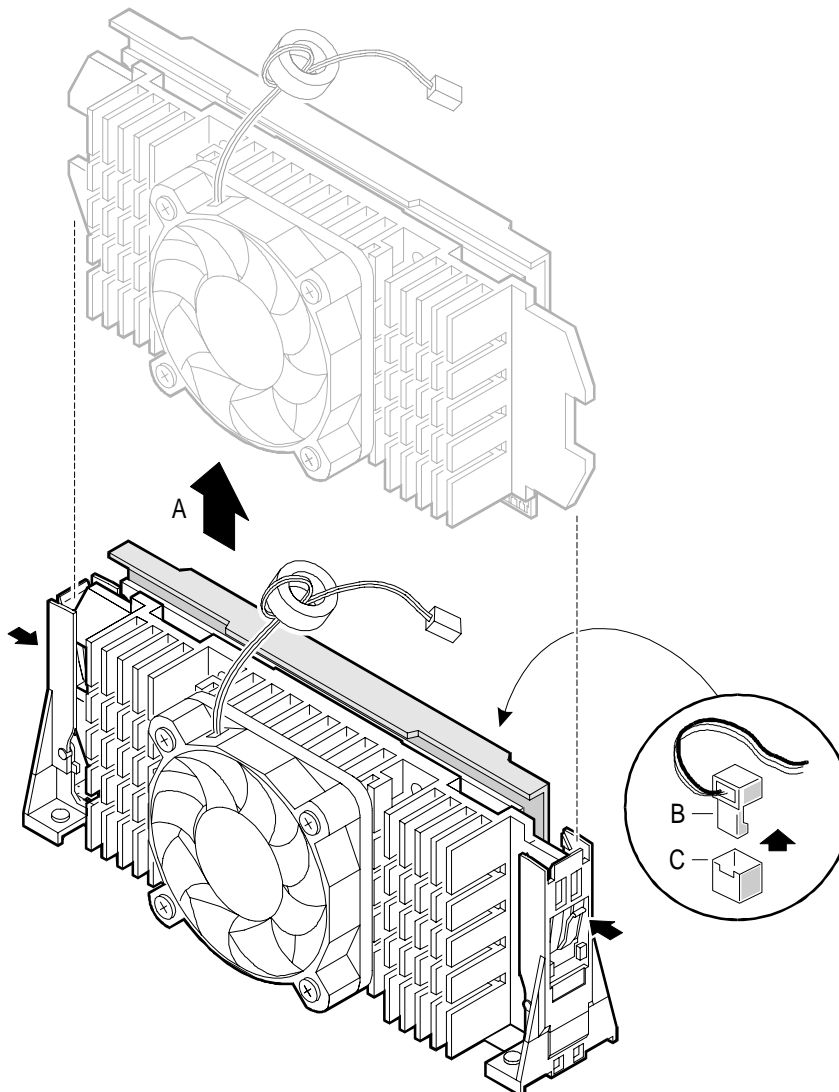
Removing the SECC2 Processor from Fansink

To remove the processor fansink, follow these steps:

1. Turn the SECC2/Fansink assembly over and lay it on a flat surface (Fan Side down).

2. Press down on the right side of the retention clip and slide right to release the right pins from the right holes. The clip will bow up to release the right pins.

3. Slide the clip to the left to release the left pins, and remove the clip.

4. Gently pull the SECC2 cartridge away from the Fansink.

Figure 2-13. Removing the SECC2 Cartridge from the Fansink
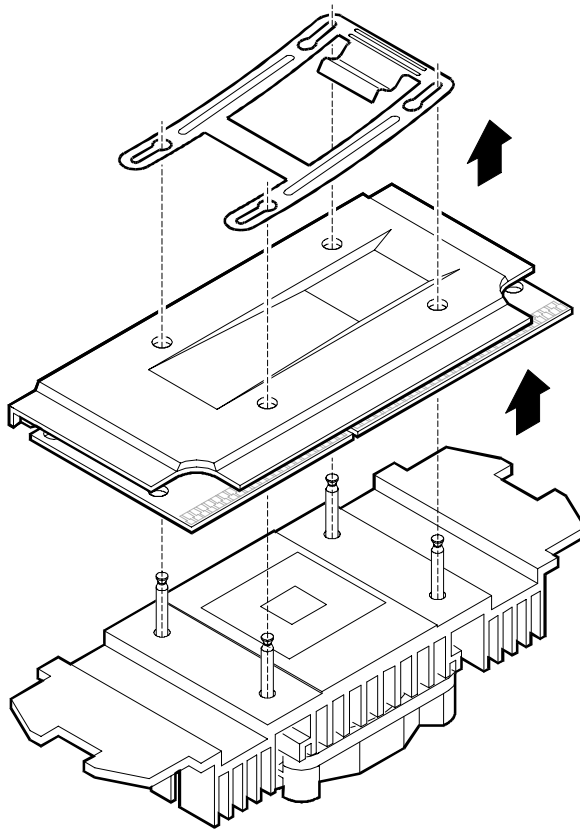
Replacing the Battery

In the absence of power, the lithium battery on the system board powers the real-time clock (RTC) for up to 10 years. When the battery starts to weaken, it loses voltage, and the system settings stored in CMOS RAM of the RTC (for example, the date and time) may become incorrect. Contact your customer service representative or dealer for a list of approved batteries.

CAUTION: If the system has been running, any installed processor and its heat sink are hot. To avoid the possibility of a burn, be careful when removing or installing system board components that are located near processors.

The following caution and translations are required by specific certifying agencies to be printed immediately adjacent to the procedure for replacing the battery.

WARNING: There is danger of an explosion if the battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the equipment manufacturer. Dispose of used batteries according to the manufacturer's instructions.

ADVARSEL!: Lithiumbatteri - Eksplosionsfare ved fejlagtig håndtering. Udskiftning må kun ske med batteri af samme fabrikat og type. Levér det brugte batteri tilbage til leverandøren.

ADVARSEL: Lithiumbatteri - Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.

VARNING: Explosionsfara vid felaktigt batteribyte. Använd samma batterityp eller en ekvivalent typ som rekommenderas av apparattillverkaren. Kassera använt batteri enligt fabrikantens instruktion.

VAROITUS: Paristo voi räjähtää, jos se on virheellisesti asennettu. Vaihda paristo ainoastaan laitevalmistajan suosittelemaan tyyppiin. Hävitä käytetty paristo valmistajan ohjeiden mukaisesti.

Figure 2-14. Replacing the Battery
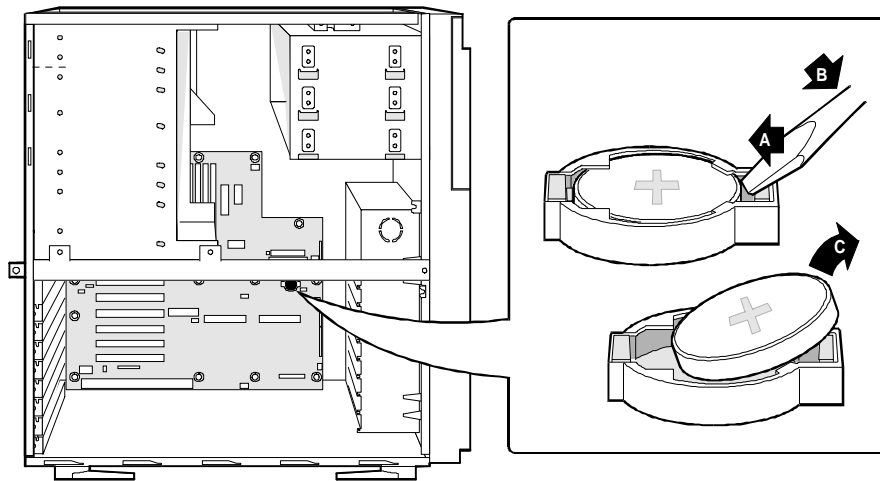
To replace the battery, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter and those at the beginning of this section.

2. Remove the side cover, referring to "Removing the Side Cover" in Chapter 1 for instructions.

3. Insert the tip of a small flat-bladed screwdriver, or equivalent, under the plastic tab on the snap-on plastic retainer and remove it. (Refer to Item A in Figure 2-14.)

4. Gently push down on the screwdriver to lift the battery. (Refer to Item B in Figure 2-14.)

5. Remove the battery from its socket. (Refer to Item C in Figure 2-14.)

6. Dispose of the battery according to the manufacturer's instructions and local ordinance.

7. Remove the new battery from its package. Being careful to observe the correct polarity, insert the battery into the battery socket.

8. Reinstall the plastic retainer on the battery socket.

9. Reattach the side cover, referring to "Reattaching the Side Cover" in Chapter 1 for instructions.

10. Run the SSU to restore the CMOS configuration data. For information on running the SSU, refer to Chapter 4 of the *Product Guide*.

Setting System Board Jumpers

Jumper Locations and Functions

Figure 2-15 shows the locations of the jumpers on the system board. The shaded area on each jumper illustration shows the default jumper placement. The jumper functions are listed in the tables that follow the figures.

Figure 2-15. System Board Jumpers
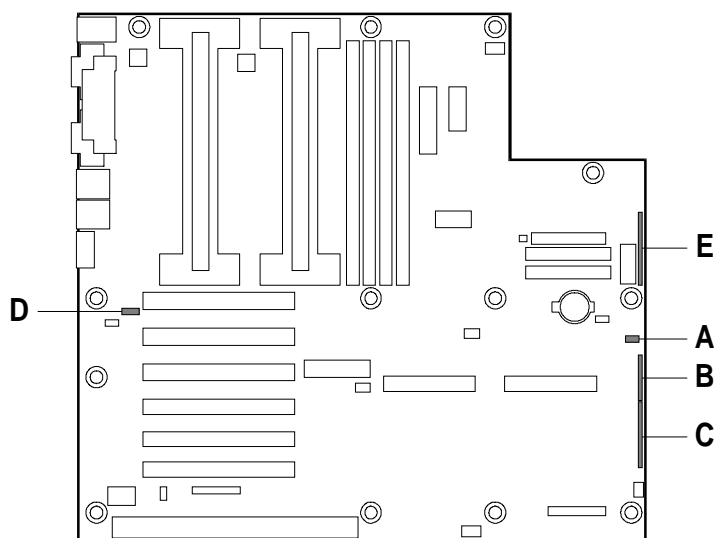
J4J2 Jumper Block
(Block A)

1 2 3
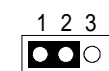
BMC Boot
Block Protect

J3J1 Jumper Block
(Block B)

11
10   BMC Forced Update
9   Mode Disable

7   Chassis Intrusion
6   Detection Disable
5

3
2   FRB Timer
1   Enable

J2J1 Jumper Block
(Block C)

15
14   BIOS Boot
13   Block Protect

11
10
9   Normal Boot

7
6
5   Password Protect

3
2
1   CMOS Clear Protect

J5A2 Jumper Block
(Block D)

3 2 1

Wake On LAN
(WOL) Enabled

J6J1 Jumper Block
(Block E)

1   Pwr Cntrl
2   Ground
      No Pin
4   HD LED Pwr
      No Pin
6   HD Activity
7   HD LED Pwr
8   Ground
      No Pin
10   Speaker Int
11   Speaker Out
12   Ground
      No Pin
14   Power LED
      No Pin
16   Ground
17   Reset
18   Sleep
19   Ground

Jumper Functions (Blocks A-D)

Jumper Block	Function	Pins (default in bold)	What it does at system reset
A	BMC Boot Block	**1-2, Protect**	The BMC boot block is write-protected.
		2-3, Write Enable	The BMC boot block is erasable and programmable.
B	FRB Timer	**1-2, Enable**	FRB operation is enabled (the system boots from processor 1 if processor 0 fails).
		2-3, Disable	FRB operation is disabled.
B	Chassis Intrusion Detection	5-6, Enable	The chassis intrusion switch indicates when the cover has been removed.
		6-7, Disable	The chassis intrusion switch is bypassed.
B	BMC Forced Update Mode	**9-10, Disable**	The system boots normally.
		10-11, Enable	The system updates the BMC firmware.
C	CMOS Clear	**1-2, Protect**	The contents of NVRAM are retained.
		2-3, Clear	The contents of NVRAM are replaced with the factory-default settings.
C	Password	**5-6, Protect**	The current system password is retained.
		6-7, Clear	The current system password is cleared.
C	Boot	**9-10, Normal**	The system boots using the BIOS code stored in system flash memory, unless the BIOS code has been corrupted.
		10-11, Recovery	The system performs a recovery boot, loading the BIOS code into system flash memory from a BIOS Flash Backup diskette. This is typically done when the BIOS code stored in system flash memory has been corrupted.
C	BIOS Boot Block	**13-14, Protect**	The BIOS boot block is write-protected.
		14-15, Write Enable	The BIOS boot block is erasable and programmable.
			CAUTION: Programming the BIOS boot block incorrectly prevents the system from booting.
D	Wake on LAN (WOL)	1-2, Disable	WOL is disabled.
		2-3, Enable	WOL is enabled.

Jumper Block J6J1 (ATX-style Front Panel Connector)

Block	Connector	Pin	Signal
A	Power switch	1 2 3	Power control Ground No pin
B	Hard drive activity LED	4 5	Hard drive LED power No pin

Block	Connector	Pin	Signal
		6	Hard drive activity
		7	Hard drive LED power
C	Speaker	8	Ground
		9	No pin
		10	Speaker internal
		11	Speaker out
D	Power LED	12	Ground
		13	No pin
		14	Power LED
		15	No pin
E	Reset switch	16	Ground
		17	Reset
F	Sleep switch	18	Sleep
		19	Ground

General Procedure for Changing a Jumper Setting

WARNING: AC power must be removed from the system before changing the system jumpers.

CAUTION: Installing or removing jumpers: A jumper is a small, plastic-encased conductor that slips over two jumper pins. Newer jumpers have a small tab on top that you can grip with your fingertips or with a pair of fine, needle-nosed pliers. If your jumpers do not have such a tab, take care when using needle-nosed pliers to remove or install a jumper; grip the narrow sides of the jumper with the pliers, never the wide sides. Gripping the wide sides can damage the contacts inside the jumper, causing intermittent problems with the function controlled by that jumper. Take care to gently grip, but not squeeze, with the pliers or other tool that you use to remove a jumper. Otherwise, you may bend or break the stake pins on the board.

Note: The following general procedure for changing a jumper setting applies to most jumpers.

Note: Depending on the function of the jumper, you may need to repeat the procedure to move the jumper back to its original setting. You may also need to run the BIOS Setup Utility and/or the SSU to reconfigure the system. Refer to Chapter 4 of the *Product Guide* for information on using Setup and the SSU.

To change a jumper setting, follow these steps:

1. Observe all safety and ESD precautions at the beginning of this chapter and the warning at the beginning of this section.

2. Remove the side cover, referring to "Removing the Side Cover" in Chapter 1 for instructions.

   You do not need to remove the system board from the chassis, and you probably do not need to remove any of the expansion boards.

3. Referring to Figure 2-15, locate the configuration jumpers. Most of them are located at the edge of the system board toward the front of the server cabinet.

4. Move the jumper to the pins specified for the desired setting.

5. Reattach the side cover, referring to "Reattaching the Side Cover" in Chapter 1 for instructions.

Procedures for Changing Specific Jumper Settings

WARNING: AC power must be removed from the system before changing the system jumpers.

CAUTION: Installing or removing jumpers: A jumper is a small, plastic-encased conductor that slips over two jumper pins. Newer jumpers have a small tab on top that you can grip with your fingertips or with a pair of fine, needle-nosed pliers. If your jumpers do not have such a tab, take care when using needle-nosed pliers to remove or install a jumper; grip the narrow sides of the jumper with the pliers, never the wide sides. Gripping the wide sides can damage the contacts inside the jumper, causing intermittent problems with the function controlled by that jumper. Take care to gently grip, but not squeeze, with the pliers or other tool that you use to remove a jumper. Otherwise, you may bend or break the stake pins on the board.

This section provides procedures for changing specific jumper settings, and guidelines for when those settings should be changed.

Note: Depending on the function of the jumper, you may need to repeat the procedure to move the jumper back to its original setting. You may also need to run the BIOS Setup Utility and/or the SSU to reconfigure the system. Refer to Chapter 4 of the *Product Guide* for information on using Setup and the SSU.

CMOS Clear Jumper

The jumper at pins 1–3 of Jumper Block J2J1 controls whether the settings stored in CMOS NVRAM are retained during a system reset, or restored to their factory defaults.

To clear the CMOS contents and restore the factory-default settings, follow these steps:

1. Turn off the server, disconnect the AC power cord from the system, and remove the server side cover.

2. Move the CMOS Clear Jumper from pins 1–2 to pins 2–3.

3. Reinstall the server side cover for your safety, and reconnect the AC power cord to the system.

4. Turn on the monitor and server, and wait for POST to complete.

   When POST is complete, the message `NVRAM cleared by jumper` appears. At this point, the automatic reprogramming of CMOS to the factory-default settings has occurred.

5. When the `Press <F2> to enter Setup` message appears, press **F2** to run the BIOS Setup Utility.

6. Make any necessary changes in Setup; then press **F10** to save the new Setup configuration and exit Setup.

7. Turn off the server, disconnect the AC power cord from the system, and remove the server side cover again.

8. Move the CMOS Clear Jumper from pins 2–3 back to pins 1–2.

9. Reinstall the side cover and reconnect the AC power cord to the system.

10. Run the BIOS Setup Utility and the SSU to verify the correct settings. Refer to Chapter 4 of the *Product Guide* for information on using Setup and the SSU.

Password Jumper

The jumper at pins 5–7 of Jumper Block J2J1 controls whether the system password is retained or cleared during a system reset. This jumper may need to be moved if the system password is forgotten.

To clear the current password and enter a new one afterwards, follow these steps:

1. Turn off the server, disconnect the AC power cord from the system, and remove the server side cover.

2. Move the Password Jumper from pins 5–6 to pins 6–7.

3. Reinstall the server side cover for your safety, and reconnect the AC power cord to the system.

4. Turn on the monitor and server, and wait for POST to complete.

   When POST is complete, the password has been cleared.

5. Turn off the server, disconnect the AC power cord from the system, and remove the server side cover again.

6. Move the Password Jumper from pins 6–7 back to pins 5–6.

7. Reinstall the side cover and reconnect the AC power cord to the system.

8. Run the SSU to specify a new password. Refer to Chapter 4 of the *Product Guide* for information on using the SSU.

Boot Jumper

Note: This section describes the procedure you must follow to restore the system BIOS after it has been corrupted. Typically, this may occur when an attempted BIOS flash update fails, perhaps due to power being interrupted during the update operation.

The jumper at pins 9–11 of Jumper Block J2J1 controls whether the system tries to boot using the BIOS code stored in system flash memory (normal boot), or performs a recovery boot, loading the BIOS code into system flash memory from a BIOS Flash Backup diskette.

To perform a boot recovery operation and restore the system BIOS, follow these steps:

1. Turn off the server, disconnect the AC power cord from the system, and remove the server side cover.

2. Move the Boot Jumper from pins 9–10 to pins 10–11.

3. Reinstall the server side cover for your safety, and reconnect the AC power cord to the system.

4. Insert the BIOS Flash Backup diskette in drive A and turn on the server.

   After the system boots, the speaker emits a single beep when the recovery operation begins. The operation takes about three minutes. When the recovery operation is complete, the speaker emits two beeps to indicate successful completion. While the recovery operation is taking place, there is no screen display. Therefore, you must rely on the beep codes for status information. The following table describes these beep codes.

Boot Recovery Beep Codes

Beep Code	Message
1	The recovery operation is beginning.
2	The recovery operation completes successfully.
4	The system cannot boot from the diskette; it may not be bootable.
Continuous series of low beeps	The wrong BIOS recovery files are found on the diskette, or the Boot Jumper is in the wrong position.

5. After the recovery operation completes successfully, turn off the server, disconnect the AC power cord from the system, and remove the server side cover again.

6. Move the Boot Jumper from pins 10–11 back to pins 9–10.

7. Reinstall the side cover, reconnect the AC power cord to the system, and remove the BIOS Flash Backup diskette from drive A.

8. Run the BIOS Setup Utility and the SSU to reconfigure the system as necessary. Refer to Chapter 4 of the *Product Guide* for information on using Setup and the SSU.

BIOS Boot Block Jumper

The jumper at pins 13–15 of Jumper Block J2J1 controls whether the BIOS boot block is protected from erasure and reprogramming.

CAUTION: Leave the BIOS Boot Block Jumper at the factory setting. Programming the BIOS boot block incorrectly prevents the system from booting. Only a technically qualified person should perform BIOS boot block programming, which requires a special "Boot Block Update Utility." Contact your dealer or sales representative for more information.

FRB Timer Jumper

The jumper at pins 1–3 of Jumper Block J3J1 controls the two Fault-Resilient Boot (FRB) timers. The timers are enabled by default. Refer to "Fault-Resilient Booting" in Chapter 3 for more information on the FRB timers.

To disable the FRB timers, follow these steps:

1. Turn off the server, disconnect the AC power cord from the system, and remove the server side cover.
2. Move the FRB Timer Jumper from pins 1–2 to pins 2–3.
3. Reinstall the server side cover and reconnect the AC power cord to the system.
4. Run the SSU to reconfigure the system as necessary. Refer to Chapter 4 of the *Product Guide* for information on using the SSU.

Note: To re-enable the FRB timers, perform Steps 1–4 above, but move the FRB Timer Jumper back to pins 1–2 during Step 2.

Chassis Intrusion Detection Jumper

The chassis contains an alarm switch that sends a notification signal to the server management software if a server cover is removed. The jumper at pins 5–7 of Jumper Block J3J1 controls whether this alarm feature is enabled or disabled.

To disable (bypass) the chassis intrusion switch, follow these steps:

1. Turn off the server, disconnect the AC power cord from the system, and remove the server side cover.
2. Move the Chassis Intrusion Detection Jumper from pins 5–6 to pins 6–7 to disable the alarm switch.
3. Reinstall the server side cover, and reconnect the AC power cord to the system.
4. Run the SSU to reconfigure the system as necessary. Refer to Chapter 4 of the *Product Guide* for information on using the SSU.

Note: To re-enable the chassis intrusion switch, perform Steps 1–4 above, but move the Chassis Intrusion Detection Jumper back to pins 5–6 during Step 2.

Note: Chassis Intrusion Detection may be enabled on your server. However, your server does not have a chassis intrusion switch installed. If you install LANDesk and a Server Management Adapter, you should disable the Chassis Intrusion Detection Jumper to prevent any false chassis intrusion alarm detected by LANDesk.

BMC Forced Update Mode Jumper

The jumper at pins 9–11 on Jumper Block J3J1 controls whether the BMC firmware is updated during a system reset.

To force a BMC update, follow these steps:

1. Turn off the server, disconnect the AC power cord from the system, and remove the server side cover.
2. Move the BMC Forced Update Mode Jumper from pins 9–10 to pins 10–11.
3. Reinstall the server side cover for your safety, and reconnect the AC power cord to the system.
4. Run the SSU to reconfigure the system as necessary. Refer to Chapter 4 of the *Product Guide* for information on using the SSU.
5. Disable BMC forced update mode by performing Steps 1–4 above, but move the BMC Forced Update Mode Jumper back to pins 9–10 during Step 2.

Wake on LAN (WOL) Jumper

The jumper at pins 1–3 on Jumper Block J5A2 controls whether WOL is enabled. You change this jumper setting to disable WOL if your power supply does not provide .8A of +5V_Standby current.

To disable WOL, follow these steps:

1. Turn off the server, disconnect the AC power cord from the system, and remove the server side cover.
2. Move the WOL Jumper from pins 1–2 to pins 2–3.
3. Reinstall the server side cover and reconnect the AC power cord to the system.
4. Run the SSU to reconfigure the system as necessary. Refer to Chapter 4 of the *Product Guide* for information on using the SSU.

Note: To re-enable WOL, perform Steps 1–4 above, but move the WOL Jumper back to pins 1–2 during Step 2.

Internal Speaker Jumper/External Speaker Connector

Jumper Block J6J1 provides a way to plug in an external speaker. This jumper block has a jumper on pins 10–11 by default to enable the internal speaker. If the jumper is removed, the internal speaker is disabled, and the J6J1 jumper block converts to a connector for an external speaker.

To remove the Internal Speaker Jumper and connect an external speaker, follow these steps:

1. Turn off the server, disconnect the AC power cord from the system, and remove the server side cover.

2. Remove the Internal Speaker Jumper from pins 10–11. Retain it for possible future use.

3. Connect the external speaker to pins 8–11.

4. Reinstall the server side cover and reconnect the AC power cord to the system.

5. Run the BIOS Setup Utility and the SSU to reconfigure the system as necessary. Refer to Chapter 4 of the *Product Guide* for information on using Setup and the SSU.

Solving Problems

This chapter helps you identify and solve problems that might occur while using the system.

Resetting the System

To do this	Press
Clear system memory and reload the operating system	**Ctrl + Alt + Del**
Halt power to all peripherals, clear system memory, restart POST, and reload the operating system	Push-button power switch

You can also reset the system from within certain software applications.

Fault-Resilient Booting (FRB)

Fault-resilient booting ensures the system does not halt due to most boot problems. Two timers implemented in the board management controller (BMC) automatically reset the system if it halts.

- FRB 2 (5-second timer): If the primary processor does not boot within 5 seconds, the system automatically resets and switches to the secondary processor, if one is installed. Otherwise, it tries to boot from the primary processor again.

- FRB 3 (7-minute timer): If the system does not complete POST within 7 minutes, the system automatically resets and switches to the secondary processor, if one is installed. Otherwise, it tries to boot from the primary processor again. Bad memory or a bad expansion board may cause an FRB 3 failure.

All failures are logged to the System Event Log (SEL), which can be viewed through the SSU.

The system remembers all the FRB errors that have occurred, and displays them at the end of each POST until you select the Processor Retest option in the BIOS Setup utility.

Initial System Startup

Problems that occur when the system is powered on for the first time are usually caused by incorrect installation or configuration of the hardware. Equipment failure is a less frequent cause.

Checklist

❏ Are all the cables correctly connected and secured?

❏ Are the processors fully seated in their slots on the system board?

❏ Are all the expansion boards fully seated in their slots on the system board?

❏ Are all the jumper and switch settings on the system board correct?

❏ Are all the jumper and switch settings on expansion boards and peripheral devices correct?
To check these settings, refer to the manufacturer's documentation for the expansion boards and peripheral devices. If applicable, ensure there are no conflicts – for example, two expansion boards sharing the same interrupt.

❏ Are all the DIMMs installed correctly?

❏ Are all the expansion boards and peripheral devices installed correctly?

❏ If the system has a hard disk drive, is it properly configured and formatted?

❏ Are all the device drivers properly installed?

❏ Are the configuration settings in the SSU correct?
Refer to Chapter 4 of the *Product Guide* for information on using the SSU.

❏ Is the operating system properly loaded?
Refer to the operating system documentation for this information.

❏ Did you press the push-button power switch on the front panel to turn the server on?
If so, the power-on light should be lit.

❏ Is the system AC power cord properly connected to the system and plugged into a NEMA 5-15R outlet for 100-120 V~ or a NEMA 6-15R outlet for 200-240 V~?

❏ Is AC power available at the wall outlet?

If you answered "yes" to all the items listed above, but the problem still persists, see "More Problem-Solving Procedures" later in this chapter.

New Application Software

Problems that occur when you run new application software are usually related to the software. Faulty equipment is a much less likely cause, especially if other software runs correctly.

Checklist

❑ Does the system meet the minimum hardware requirements for the software? Refer to the software documentation for this information.

❑ Is the software an authorized copy? If not, obtain one; unauthorized copies often do not work.

❑ If you are running the software from a diskette, is it a good copy?

❑ If you are running the software from a CD-ROM, is the CD-ROM scratched or dirty?

❑ If you are running the software from a hard disk, is the software correctly installed? During software installation, were all necessary procedures followed and files installed?

❑ Are the correct device drivers installed?

❑ Is the software correctly configured for the system?

❑ Are you using the software correctly?

If you answered "yes" to all the items listed above, but the problem still persists, contact the customer service representative of the software vendor.

After the System Has Been Running Correctly

Problems that occur after the system hardware and software have been running correctly often indicate equipment failure. However, many easily correctable situations can also cause such problems. Sometimes the problem stems from changes made to the system, such as hardware or software that has been added or removed.

Checklist

❑ If you are running the software from a diskette, try using a new copy of the software.

❑ If you are running the software from a CD-ROM, try a different CD-ROM to see if the problem occurs on all disks.

❑ If you are running the software from a hard disk, try running it from a diskette.
If the software runs correctly, there may be a problem with the copy on the hard disk. Reinstall the software on the hard disk, and try running it again. Make sure all necessary files are installed.

❑ If a software application does not run correctly with the "Boot Speed" set to turbo, try setting the speed to deturbo within Setup.

❑ If the problems are intermittent, there may be a loose cable, dirt in the keyboard (if incorrect keyboard input is a symptom), a marginal power supply, or other random component failures.

❑ If you suspect that a transient voltage spike, power outage, or brownout might have occurred, reload the software and try running it again. (Symptoms of voltage spikes include a flickering video display, unexpected system reboots, and a lack of response by the system to user commands.)

Note: Random errors in data files: If you are getting random errors in your data files, they may be getting corrupted by voltage spikes on your power line. If you are experiencing any of the above symptoms that might indicate voltage spikes on the power line, you may want to install a surge suppressor between the wall outlet and the system AC power cord.

More Problem-Solving Procedures

This section provides a more detailed approach to problem identification and resolution.

Preparing for Diagnostic Testing

CAUTION: Turn off all devices before disconnecting cables: Before disconnecting any peripheral cables from the system, turn off the system and any external peripheral devices. Failure to do so can cause permanent damage to the system and/or the peripheral devices.

1. Turn off the system and all external peripheral devices. Disconnect all of them from the system, except the keyboard and monitor.

2. Make sure the system AC power cord is plugged into a properly grounded AC outlet.

3. Make sure the monitor and keyboard are correctly connected to the system. Turn on the video monitor. Set its brightness and contrast controls to at least two-thirds of their maximum ranges. Refer to the documentation supplied with your monitor for this information.

4. If the operating system normally loads from the hard disk, make sure there is no diskette in drive A. Otherwise, place a diskette containing the operating system files in drive A.

5. Turn on the system. If the power-on LED does not light, see "Power-on Light Does Not Light" later in this chapter.

Running Diagnostics

A diagnostics package for the system is contained on the Platform CD-ROM that was supplied with your system. For documentation about the test modules, see the Diagnostic help disks that end with the extension *.hlp*. The files are ASCII text files that you can print to form a manual of all the tests available for this system.

- The *testview.exe* program uses a simple DOS-based menu system to run test program modules from DOS batch files. It is not for Windows or UNIX MP-RAS. You can access it at the command line prompt without having a hard drive installed.

- The *readme.txt* file for diagnostics tells how to install the program.

CAUTION: Read help information for all tests before running them: The diagnostic package contains many optional tests that should be run only by someone with advanced technical knowledge. Inadvertent actions can be damaging, such as running a hard drive write-test on a hard disk. All tests that require external hardware or user intervention, or are destructive, are disabled in the default configuration. Before running such a test, make sure you read and understand the help information for that test.

Monitoring POST

For information on POST operations, refer to Chapter 4 of the *Product Guide* and "POST Error Codes and Messages" later in this chapter.

Verifying Proper Operation of Disk Activity Lights

While POST is determining the system configuration, it tests for the presence of each mass storage device installed on the system. As each device is checked, its activity light should briefly light up.

Check for the following:

❑ Does the diskette drive activity light turn on briefly?
If not, see "Diskette Drive Activity Light Does Not Light" later in this chapter.

❑ If a second diskette drive is installed, does its activity light turn on briefly?
If not, see "Diskette Drive Activity Light Does Not Light" later in this chapter.

❑ If there is a hard drive or SCSI devices installed on the system, does the hard drive activity light on the front panel turn on briefly?
If not, see "Hard Drive Activity Light Does Not Light" later in this chapter.

Confirming Operating System Load

After the system boots, the operating system prompt or the customary initial screen should appear. The prompt or initial screen varies depending on the operating system installed. If the operating system prompt or initial screen does not appear, see "Initial System Startup" earlier in this chapter.

Specific Problems and Corrective Actions

This section provides possible solutions for the following specific problems:

- Power-on Light Does Not Light
- No Audible Beep Codes
- No Characters Appear Onscreen
- Onscreen Characters are Distorted or Incorrect
- System Cooling Fans Do Not Rotate Properly
- Diskette Drive Activity Light Does Not Light
- Hard Drive Activity Light Does Not Light
- CD-ROM Drive Activity Light Does Not Light
- Network Problems
- Problems with Application Software
- PCI Installation Tips

For each proposed solution, try the items in the order they are listed. If you cannot correct the problem, contact your service representative or authorized dealer for assistance.

Power-on Light Does Not Light

Check the following:

❏   Are all the power supplies plugged in? Is the power turned on to the power strip or wall outlet? Do you have a blown fuse or circuit breaker?

❏   Is the system operating normally?
If so, the power LED is probably defective or the cable from the front panel to the system board is loose.

❏   Do other problems with the system exist?
If so, check the items listed under "System Cooling Fans Do Not Rotate Properly" later in this chapter.

If all the items listed above are correct, and the problem persists, contact your service representative or authorized dealer for assistance.

No Audible Beep Codes

If the system operates normally, but there are no audible beeps, the speaker may be defective. Run the SSU to verify that the speaker is enabled. If the speaker is enabled in the SSU and the speaker jumper is set correctly, but the speaker still does not function, contact your service representative or authorized dealer for assistance. For more information on correctly setting the speaker jumper, see "Internal Speaker Jumper/External Speaker Connector" in Chapter 2.

No Characters Appear Onscreen

Check the following:

❏   Is the keyboard working? Check to see that the **Num Lock** light is functioning.

❏   Is the monitor plugged in and turned on?
Many monitors power down when inactive, and may require a moment to warm up when activated by keyboard and/or mouse activity.

❏   Are the brightness and contrast controls on the monitor properly adjusted?

❏   Are the monitor switch settings correct?

❏   Is the monitor signal cable properly installed?

❏   Is the onboard video controller enabled?

If you are using a video controller other than the onboard controller, check the following:

1. Verify that the video controller board is fully seated in the system board connector (and verify that the monitor is plugged in to the ACTIVE video controller).

2. Run the SSU to disable the onboard video controller and specify that an off-board VGA/EGA adapter is installed. Reboot the system for the changes to take effect.

3. If still no characters appear onscreen after you reboot the system, but POST emits a beep code, record the beep code you hear. This information is useful to your service representative. See "Standard BIOS Port 80h Codes " later in this chapter for information on the beep codes issued during POST.

4. If still no character appear onscreen after you reboot the system, and you do not hear a beep code, the monitor or video controller may have failed. You can verify this by trying to use the monitor on another system or by trying to uses a different monitor on this system. Contact your service representative or authorized dealer for assistance.

Onscreen Characters are Distorted or Incorrect

Check the following:

❑   Are the brightness and contrast controls properly adjusted on the monitor?
    Refer to the documentation supplied with your monitor for this information.

❑   Are the signal and power cables of the monitor properly installed?

❑   Is the correct monitor/video board installed for your operating system?
    Refer to your operating system documentation for this information.

If the problem persists, the video monitor may be faulty or it may be the incorrect type. Contact your service representative or authorized dealer for assistance.

System Cooling Fans Do Not Rotate Properly

If the system cooling fans are not operating properly, system components could be damaged.

Check the following:

❑   Is AC power available at the wall outlet?

❑   Is the system AC power cord properly connected to the system and the wall outlet?

❑   Did you press the push-button power switch?

❑   Is the power-on light lit?

❑   Have any of the fan motors stopped?
    Use the server management subsystem to check the fan status.

❑   Are the fan power connectors properly connected to the system board?

❑   Is the cable from the front-panel board connected to the system board?

❑   Are the power supply cables properly connected to the system board?

❑   Are there any shorted wires caused by pinched cables, or by power connector plugs forced into power connector sockets the wrong way?

If the switches and connections are correct and AC power is available at the wall outlet, contact your service representative or authorized dealer for assistance.

Diskette Drive Activity Light Does Not Light

Check the following:

❏   Are the power and signal cables of the diskette drive properly installed?

❏   Are all relevant switches and jumpers on the diskette drive set correctly?

❏   Is the diskette drive properly configured?

❏   Is the activity light always on?
    If so, the signal cable may be plugged in incorrectly.

If you are using the onboard diskette controller, run the SSU to verify that "Onboard Floppy" is set to "Enabled." If you are using a different diskette controller, make sure "Onboard Floppy" is set to "Disabled." For information on using the SSU, see Chapter 4 of the *Product Guide*.

If the problem persists, there may be a problem with the diskette drive, system board, or drive signal cable. Contact your service representative or authorized dealer for assistance.

Hard Drive Activity Light Does Not Light

If you have installed one or more hard disk drives in your system, check the following:

❏   Are the power and signal cables of the hard drive properly installed?

❏   If your system contains a SCSI adapter expansion board, is it fully seated in the system board connector?

❏   Are all relevant switches and jumpers on the hard drive and adapter board set correctly?

❏   Is the hard drive properly configured?

❏   If your system contains a SCSI adapter expansion board, is the hard drive activity LED cable connector plugged into the controller board and the system board?

    Note: Front panel hard disk LED indicates SCSI devices. The hard drive activity light on the front panel lights when a SCSI device controlled by the onboard SCSI host controller is in use. This LED does **not** display CD-ROM drive activity.

❏   Check the following:

    Is the BIOS set to allow the CD-ROM drive to be the first bootable device?

    If you did not receive error messages, run the SSU and verify that the drive is configured with the correct parameters.

If the problem persists, there may be a problem with the drive, expansion controller board, system board, drive signal cable, or LED connector. Contact your service representative or authorized dealer for assistance.

CD-ROM Drive Activity Light Does Not Light

Check the following:

❑ Are the power and signal cables to the CD-ROM drive properly installed?

❑ Are all relevant switches and jumpers on the drive set correctly?

❑ Is the CD-ROM drive properly configured?

Note: Front panel hard disk LED indicates SCSI devices. The hard drive activity light on the front panel lights when a SCSI device controlled by the onboard SCSI host controller is in use. This LED does **not** display CD-ROM drive activity.

❑ Is the onboard IDE controller enabled?

❑ Check the following:

Is the BIOS set to allow the CD-ROM drive to be the first bootable device?

The CD-ROM drive may not be spinning fast enough to be detected. To fix this problem, you can increase the hard disk pre-delay to nine seconds.

If you did not receive error messages, run the SSU and verify that the drive is configured with the correct parameters. To run the SSU, see Chapter 4 of the *Product Guide*.

If the problem persists, there may be a problem with the CD-ROM drive, expansion controller board, system board, drive signal cable, or LED connector. Contact your service representative or authorized dealer for assistance.

Network Problems

If you have network problems, consult the documentation that came with the network board you purchased for this server.

Check the following:

❑ Make sure you are using the drivers shipped on the system Configuration Software CD-ROM for the onboard network controller.

❑ Make sure the driver is loaded and the protocols are bound.

❑ Make sure the network cable is securely attached to the connector at the system back panel and that the network controller Link LED is on (visible at back panel). If the cable is attached, but the problem persists, try a different cable.

❑ Make sure the hub port is configured for the same duplex mode as the network controller.

❑ Check with your LAN administrator about the correct networking software that needs to be installed.

❑ If you are directly connecting two servers (no hub), some hubs may also require a crossover cable. Refer to your hub documentation for more information on crossover cables.

❑ Check the network interface controller LEDs that are visible through an opening at the system back panel.
The meanings of these LEDs are described in the following table.

Network Interface Controller (NIC) LEDs

NIC LED	Status	Description
DS1		Transmit/receive activity on the LAN:
	● On or ✳ blinking	The network controller is sending or receiving data over the network. The frequency of flashes varies with the amount of network traffic.
	○ Off	The network controller is *not* sending or receiving data over the network.
LNK		Valid link to the LAN:
	● On	The network controller and hub are receiving power; and the cable connection between the controller and hub are good.
	○ Off	The controller and hub are *not* receiving power, the cable connection between the controller and hub is faulty, or you have a driver configuration problem.
100		Transfer mode: The network controller is operating at:
	● On	100 Mbps
	○ Off	10 Mbps

Problems with Application Software

If you have problems with application software, check the following:

❑ Verify that the software is properly configured for the system.
Refer to the software installation and operation documentation for instructions on setting up and using the software.

❑ Try a different copy of the software to determine whether the problem exists with the copy you are using.

❑ Make sure all cables are installed correctly.

❑ Verify that the system board jumpers are set correctly.
Refer to Chapter 2 for jumper locations and settings.

❑ If other software runs correctly on the system, contact your vendor about the failing software.

If the problem persists, contact the customer service representative of the software vendor for assistance.

PCI Installation Tips

Some common PCI tips are listed below.

❑ Reserve interrupts (IRQs) and/or memory addresses specifically for ISA adapters. This prevents PCI boards from trying to use the same settings ISA boards are using. Use the SSU to keep track of ISA adapter resources.

❑ Certain drivers may require interrupts that are not shared with other PCI drivers. The SSU can be used to adjust the interrupt numbers for PCI devices. For certain drivers, it may be necessary to alter settings so that interrupts are not shared.

❑ Check PCI interrupt interdependencies among slots and onboard devices.

Error and Informational Messages

When you power on the system, POST displays onscreen messages about the system components as it tests them. If POST encounters a problem in the hardware, software, or firmware, it emits a beep code to indicate the error(s). If POST can display an onscreen message, it emits two beeps as the message appears.

Standard BIOS Port 80h Codes during POST

After the video adapter has been successfully initialized, the current POST testing phase is indicated by a 2-digit hex code that is output to I/O location 80h. If a port 80h ISA POST board is installed, the 2-digit code is displayed on a pair of hex display LEDs. The following tables lists the port 80h codes, the beep codes, and the current testing phase.

Standard Port 80h Code	Beep Code	Current Testing Phase
00		Wait for secondary processor to execute init SMI handler
02		Verify Real Mode
04		Get processor type
06		Initialize system hardware
08		Initialize chipset registers with initial POST values
09		Set in POST flag
0A		Initialize processor registers and processor microcode
0B		Enable processor cache
0C		Initialize caches to initial POST values
0E		Initialize I/O
0F		Initialize the local bus IDE
10		Initialize Power Management
11		Load alternate registers with initial POST values
12		Restore processor control word during warm boot

Standard Port 80h Code	Beep Code	Current Testing Phase
14		Initialize keyboard controller
16	1-2-2-3	BIOS ROM checksum
17		Turn cache off
18		8254 timer initialization
1A		8237 DMA controller initialization
1C		Reset Programmable Interrupt Controller
20	1-3-1-1	Test DRAM refresh
22	1-3-1-3	Test 8742 Keyboard Controller
24		Set ES segment register to 4GB
28	1-3-3-1	Autosize DRAM
29		POST Memory Manager (PMM) Initialization
2A		Clear 512 KB base RAM
2C	1-3-4-1	RAM failure on address line xxxx*
2E	1-3-4-3	RAM failure on data bits xxxx* of low byte of memory bus
2F		Initialize L2 Cache if enabled in CMOS
32		Test processor bus-clock frequency
33		POST Dispatch Manager Initialization
34		Test CMOS
38		Shadow system BIOS ROM
3A		Autosize cache
3C		Configure advanced chipset registers
3D		Load alternate registers with CMOS values
42		Initialize interrupt vectors
45		Initialize all ore-PNP devices
46	2-1-2-3	Check ROM copyright notice
48		Check video configuration against CMOS (VGA or MDA)
49		Initialize PCI bus and devices (also read escd and allocate resources)
4A		Initialize all video adapters in system
4B		Display QuietBoot screen (not used)
4C		Shadow video BIOS ROM
4E		Display copyright notice
50		Display processor type and speed
51		Initialize EISA board
52		Reset and test keyboard controller
54		Set key click if enabled
58	2-2-3-1	Test for unexpected interrupts
59		POST Display Manager initialization (video screen error codes now visible)

Standard Port 80h Code	Beep Code	Current Testing Phase
5A		Display prompt "Press F2 to enter SETUP"
5B		Disable processor L1 cache for memory test
5C		Test RAM between 512 KB and 640 KB
60		Test extended memory
62		Test extended memory address lines
64		Jump to UserPatch1
66		Configure advanced cache registers
67		Initialize and register other processor via SMM through apic bus
68		Enable external and processor caches
69		Initialize SMI processor for all processors
6A		Display external cache size
6C		Display shadow message
6E		Display non-disposable segments
70		Display error messages
72		Check for configuration errors
74		Test RTC
76		Enable keyboard
7C		Set up hardware interrupt vectors
7E		Test coprocessor if present
81		Late post core initialization of devices
83		Configure onboard hard disk controller
84		Clear interrupts from COM port detection
85		Initialize and detect PC-compatible PnP ISA devices
86		Console redirection initialized
87		Configure mcd devices
88		Initialize BIOS Data Area, timeouts for detecting parallel, serial, and hdd controller; clear CMOS shutdown flag
89		Enable NMI
8A		Initialize Extended BIOS Data Area
8B		Detect and test for Mouse or Auxiliary device on keyboard controller
8C		Initialize floppy controller
8F		Get total number of hard drives and put in BDA
90		Initialize and detect hard disks
91		Program IDE hard drives (timing, pio modes)
92		Jump to UserPatch2
93		Scan for User flash ROMs. MP table utilization (wake up secondary processor and halt it
95		Install CD-ROM for boot

Standard Port 80h Code	Beep Code	Current Testing Phase
97		Fixup MP table (Checksum)
98	1-2	Search for option ROMs. One long, two short beeps on checksum failure
99		Check smart harddrive
9C		Set up Power Management (not used)
9D		Enable security
9E		Enable hardware interrupts
9F		Save total number of hard drives (SCSI and ATA) in BDA
A0		Set time of day
A2		Check key lock
A4		Initialize typematic rate
A8		Erase F2 prompt
AA		Scan for F2 key stroke
AC		Initialize EMP port, if present. Remove COM2 from BDA, if EMP is enabled. Enter SETUP
AE		Clear in-POST flag
B0		Turn on secure boot if enabled (secure front panel, blank video, floppy write-protect). Check for errors
B2		POST done – prepare to boot Operating System
B4	1	One short beep before boot
B5		Display QuietBoot (not used)
B6		Check password (optional)
B7		ACPI configuration (table configuration in memory and BDA)
BA		Not used
BC		Clear parity checkers
BD		Display multiboot menu if ESC is pressed
BE		Clear screen
BF		Display system config summary (if enabled in CMOS)
C0		Try to boot with INT 19; return to video mode 3; disable PMM; return to real mode; disable gate A20; clear system memory; reset stack; invoke INT19
C1		POST Error Manager initialization
C2		Initialize DMI tables
C3		Log POST errors with POST Error Manager and to SEL in BMC; also update VID bits and memory presence to BMC display and FRB errors (watchdog timeouts, bist, or processor failures)
C4		Initialize system flags in CMOS
C5		Initialize GPNV areas of DMI
C7		Prepare to boot to OS, clean up graphics and PMM areas
F4		Exit SMI handler (secondary processor executed halt in SMI)
		Error handling POST codes (may occur anytime during POST)

Standard Port 80h Code	Beep Code	Current Testing Phase
DO		Interrupt handler error
D2		Unknown interrupt error
D4		Pending interrupt error
D6		Initialize option ROM error
D8		Shutdown error
DA		Extended Block Move
DC		Shutdown 10 error

POST Error Codes and Messages

The following table lists the POST error codes and messages that represent various error conditions POST encounters. The exact POST error codes and message strings and error numbers may be different from those listed here.

POST Error Code	Error Message	Pause on Error?
0162	BIOS unable to apply BIOS update to processor 1	Yes
0163	BIOS unable to apply BIOS update to processor 2	Yes
0164	BIOS does not support current stepping for processor 1	Yes
0165	BIOS does not support current stepping for processor 2	Yes
0200	Failure Fixed Disk	No
0210	Stuck Key	No
0211	Keyboard error	No
0212	Keyboard Controller Failed	Yes
0213	Keyboard locked – Unlock key switch	Yes
0220	Monitor type does not match CMOS – Run SETUP	No
0230	System RAM Failed at offset	No
0231	Shadow RAM Failed at offset	No
0232	Extended RAM Failed at offset	No
0250	System battery is dead – Replace and run SETUP	Yes
0251	System CMOS checksum bad – Default configuration used	Yes
0260	System timer error	No
0270	RTC error	No
0297	Error Correcting Code (ECC) memory error in base (extended) memory test in Bank xx	Yes
02B2	Incorrect Drive A type – Run SETUP	No
02B3	Incorrect Drive B type – Run SETUP	No
02D0	System cache error – Cache disabled	No

POST Error Code	Error Message	Pause on Error?
02F5	DMA Test Failed	No
02F6	Software NMI Failed	No
0401	Invalid System Configuration Data – Run SSU	No
None	System Configuration Data-Read Error	No
0403	Resource Conflict	No
0404	Resource Conflict	No
0405	Expansion ROM not initialized	No
0406	Warning: IRQ not configured	Error
0504	Resource Conflict	No
0505	Expansion ROM not initialized	No
0506	Warning: IRQ not configured	No
0601	Device configuration changed	No
0602	Configuration error – Device disabled	Yes
8100	Processor 0 failed BIST	Yes
8101	Processor 1 failed BIST	Yes
8104	Processor 0 Internal Error (IERR) failure	Yes
8105	Processor 1 Internal Error (IERR) failure	Yes
8106	Processor 0 Thermal Trip failure	Yes
8107	Processor 1 Thermal Trip failure	Yes
8108	Watchdog Timer failed on last boot, BSP switched	Yes
810A	Processor 1 failed initialization on last boot	Yes
810B	Processor 0 failed initialization on last boot	Yes
810C	Processor 0 disabled, system in uni-processor mode	Yes
810D	Processor 1 disabled, system in uni-processor mode	Yes
810E	Processor 0 failed FRB Level 3 timer	Yes
810F	Processor 1 failed FRB Level 3 timer	Yes
8110	Server Management Interface failed to function	Yes
8120	IOP subsystem is not functional	Yes
8150	NVRAM Cleared by Jumper	Yes
8151	NVRAM Checksum Error – NVRAM cleared	Yes
8152	NVRAM Data Invalid – NVRAM cleared	Yes

Technical Reference

This chapter describes locations and/or pin-outs for the following:

- Connectors
- System I/O Addresses
- Memory Addresses
- Interrupts
- Video Modes

Connectors

This section provides pin information for the connectors on the system board. Figure 4-1 shows their locations.

Figure 4-1. System Board Connector and Component Locations
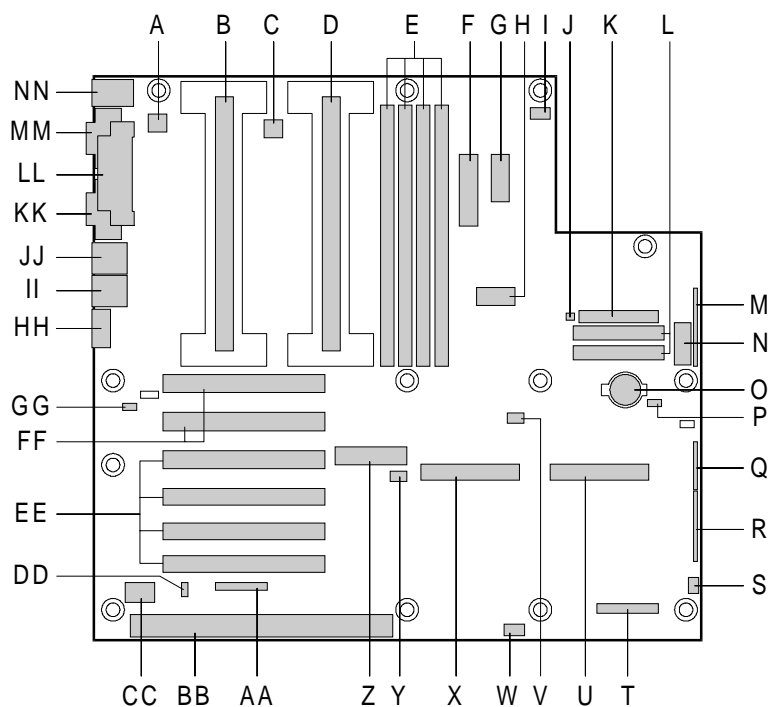
A	Heat sink Fan 2 connector	U	Ultra-wide SCSI connector
B	Secondary processor	V	External Wake on LAN connector
C	Heat sink Fan 1 connector	W	BUD connector
D	Primary processor	X	Ultra LVDS SCSI connector
E	DIMM slots	Y	Hard drive LED connector
F	Main power connector	Z	Adaptec ARO-1130 connector
G	Auxiliary power connector (J8F1)	AA	ICMB connector
H	ATX Aux power connector	BB	ISA connector
I	SM IMB	CC	ICMB card connector
J	Chassis Fan 2A connector	DD	Chassis intrusion connector
K	Diskette drive connector	EE	PCI-33 connectors
L	IDE connectors	FF	PCI-66 connectors
M	ATX front panel connector	GG	Chassis Fan 2B connector
N	IMB front panel connector	HH	VGA video port connector
O	Battery	II	USB connectors
P	ISOL IMB	JJ	NIC connector
Q	Jumper Block	KK	Serial port connector
R	Jumper Block	LL	Parallel port connector
S	Chassis Fan 1 connector	MM	Serial port connector
T	IMB SMM connector	NN	Keyboard and mouse connectors (interchangeable)

Power Connectors

The system board supports a standard 300 W ATX power supply. The 20-pin ATX connector from the power supply is inserted into pins 1–20 of the 24-pin main power connector on the system board. The 24-pin connector is keyed so that the 20-pin connector can only be inserted in one way.

24-Pin Main Power Connector

Pin	Signal	Wire color	Pin	Signal	Wire color
1	+3.3VDC	Orange	13	+3.3VDC	Orange
2	+3.3VDC	Orange	14	-12 VDC	Blue
3	COM	Black	15	COM	Black
4	+5VDC	Red	16	PS-ON #	Green
5	COM	Black	17	COM	Black
6	+5VDC	Red	18	COM	Black
7	COM	Black	19	COM	Black
8	PWR-OK	Grey	20	-5VDC	White
9	5 VSB	Purple	21	+5VDC	Red
10	+12VDC	Yellow	22	+5VDC	Red
11	+12VDC	Yellow	23	+5VDC	Red
12	+3.3VDC	Orange	24	COM	Black

20-pin ATX Power Connector

Pin	Signal	Wire Color	Pin	Signal	Wire Color
1	+5VDC	Red	13	+5VDC	Red
2	+5VDC	Red	14	+5VDC	Red
3	-5VDC	White	15	+5VDC	White
4	-12VDC	Blue	16	+5VDC	Blue
5	COM	Black	17	COM	Black
6	COM	Black	18	COM	Black
7	COM	Black	19	COM	Black
8	COM	Black	20	N/A	
9	COM	Black	21	N/A	
10	+3.3VDC	Orange	22	N/A	
11	+12V	Yellow	23	N/A	
12	+12VDC	Yellow	24	N/A	

Auxiliary Power Connector

If additional power to the system board is required beyond the amount supplied by the main power connector, the 6-pin auxiliary connector can be used.

Pin	Signal	Wire Color
1	COM	Black
2	COM	Black
3	COM	Black
4	+3.3VDC	Orange
5	+3.3VDC	Orange
6	+5VDC remote sense return	Red

Peripheral Power Connector

Pin	Description
1	+12VDC
2 and 3	GND
4	+5.1VDC

Fan Interface Connectors

The system board has five 3-pin, shrouded and keyed, fan connectors. Each fan connector has the same pin-out.

Chassis Fan Connectors

Three of the five fan connectors attach to fans equipped with a sensor that indicates whether the fan is operating. The sensor pins for these fans are routed to the BMC for failure monitoring.

Note: Chassis Fans 2A and 2B cannot be used at the same time. One or the other can be used in conjunction with Chassis Fan 1.

Pin	Signal
1	GND
2	+12V
3	Fan sensor

Heat Sink Fan Connectors

Two of the five fan connectors are located next to the processor sockets (one for each processor) for a tachometer fan heat sink.

Pin	Signal
1	GND
2	+12V
3	Fan sensor

Intelligent Management Bus (IMB) Connectors

The IMB is a multi-master, open-drain, serial bus that is also electrically and timing-compatible with the 100 Kbps version of the IMB specification. The IMB attaches to connectors on the system board, creating a server management network that extends throughout the system board and chassis, and providing an independent pathway for communications between the BMC and system-level server management devices. The following connectors are part of this subsystem:

- Auxiliary IMB Connector (J4J1)
- Front Panel Connectors (J5J1 and J6J1)
- Server Monitor Module (SMM) Connector (J1H1)

Auxiliary IMB Connector (J4J1)

Pin	Signal
1	LOCAL_IMB_SCL
2	GND
3	LOCAL_IMB_SDA

Front Panel Connector (J5J1)

This front panel connector meets the standard AT interface for LED indicators and other functions.

Pin	Signal	Pin	Signal
1	GND	2	Hard drive activity LED
3	Front-panel reset switch	4	Front-panel power switch
5	+5 VDC	6	Key
7	Front-panel NMI switch	8	+5 VDC
9	Fan-failure LED	10	Chassis intrusion switch
11	Power-fault LED	12	+5V_Standby
13	IMB data line	14	GND
15	IMB clock line	16	GND

Front Panel Connector (J6J1)

Pin	Signal	Function
1	Power switch	Front-panel power switch
2	GND	
3	Current limited +5V	Hard drive activity LED
4	Key	
5	Hard drive activity LED	
6	Current limited +5V	
7	Current limited +5V	Power LED
8	No connection	
9	GND	
10	GND	Front-panel reset switch
11	Reset switch	

SMM Connector (J1H1)

Pin	Signal	Description
1	CPU_SMI_L	SMI indication
2	LOCAL_IMB_SCL	IMB clock line
3	GND	Ground
4	Reserved	N/A
5	PWR_CNTRL_SFC_L	Host power supply on/off control
6	LOCAL_IMB_SDA	I^2C serial data line
7	5VSTNDBY	+5V_Standby indication (power OK)
8	KEYLOCK_SFC_L	Keyboard lock signal
9	CPU_NMI	NMI indication
10	VCC3	3.3V power supply status input
11	RST_SFC_L	System board reset signal from SMM
12	GND	Ground
13	GND	Ground
14	Reserved	N/A
15	SECURE_MODE_BMC	Secure Mode indication
16	GND	Ground
17	SFC_CHASSIS_INSTRUSION_L	Chassis intrusion indication
18	Reserved	N/A
19	Reserved	N/A
20	GND	Ground
21	Reserved	N/A
22	Reserved	N/A
23	Reserved	Not used
24	Reserved	N/A
25	Key pin (N/C)	Connector key
26	Reserved	N/A

VGA Video Port Connector

Figure 4-2. VGA Video Port Connector
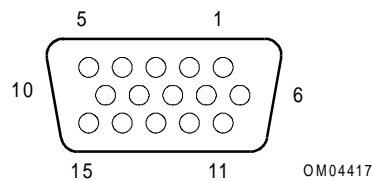
Pin	Signal
1	Red
2	Green
3	Blue
4	Not connected
5	Video GND (shield)
6	Video GND (shield)
7	Video GND (shield)
8	Video GND (shield)
9	Not connected
10	GND (video ground)
11	Not connected
12	DDCDAT (monitor ID data)
13	HSYNC (horizontal synchronization)
14	VSYNC (vertical synchronization)
15	DDCCLK (monitor ID clock)

Keyboard and Mouse Connectors

Figure 4-3. Keyboard and Mouse Connectors (Interchangeable)
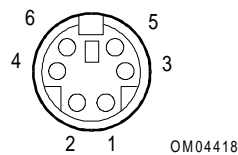
Pin	Keyboard signal	Pin	Mouse signal
1	KEYDAT (keyboard data)	1	MSEDAT (mouse data)
2	Not connected	2	Not connected
3	GND	3	GND
4	FUSED_VCC (+5V)	4	FUSED_VCC (+5V)
5	KEYCLK (keyboard clock)	5	MSECLK (mouse clock)
6	Not connected	6	Not connected

Parallel Port Connector

The parallel port is IEEE 1284-compatible.

Figure 4-4. Parallel Port Connector
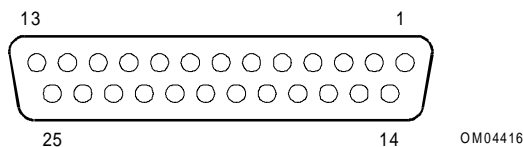
Pin	Signal
1	STROBE_L
2	Data bit 0
3	Data bit 1
4	Data bit 2
5	Data bit 3
6	Data bit 4
7	Data bit 5
8	Data bit 6
9	Data bit 7
10	ACK_L (acknowledge)
11	Busy
12	PE (paper end)
13	SLCT (select)
14	AUFDXT (auto feed) #
15	ERROR_L
16	INIT_L (initialize printer)
17	SLCTIN_L (select input) #
18–25	GND

Serial Port Connectors A and B

Figure 4-5. Serial Port Connectors A and B
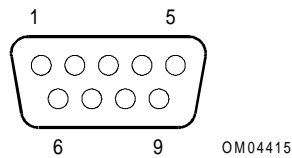
Pin	Serial Port A and B Signal
1	DCD (data carrier detect)
2	RXD (receive data)
3	TXD (transmit data)
4	DTR (data terminal ready)
5	GND
6	DSR (data set ready)
7	RTS (request to send)
8	CTS (clear to send)
9	RIA (ring indicator)

RJ-45 Network Connector

Pin	Signal	Description
1	TX+	Transmit data plus: The positive signal for the TD differential pair contains the serial output data stream transmitted onto the network.
2	TX-	Transmit data minus: The negative signal for the TD differential pair contains the same serial output as pin 1.
3	RX+	Receive data plus: The positive signal for the RD differential pair contains the serial input data stream received from the network.
4	No connection	
5	No connection	
6	RX-	Receive data minus: The negative signal for the RD differential pair contains the same serial input as pin 3.
7	No connection	
8	No connection	

Drive Connectors

Diskette Drive Connector

Pin	Signal	Pin	Signal
1	GND	18	FD_DIR_L
2	FD_DENSEL	19	GND
3	GND	20	FD_STEP_L
4	N/C	21	GND
5	Key	22	FD_WDATA_L
6	FD_DRATE0	23	GND
7	GND	24	FD_WGATE_L
8	FD_INDEX_L	25	GND
9	GND	26	FD_TRK0_L
10	FD_MTR0_L	27	FD_MSEN0
11	GND	28	FD_WPROT_L
12	FD_DR1_L	29	GND
13	GND	30	FD_RDATA_L
14	FD_DR0_L	31	GND
15	GND	32	FD_HDSEL_L
16	FD_MTR1_L	33	GND
17	FD_MSEN1	34	FD_DSKCHG_L

Hard Drive Activity LED Connector

Pin	Signal	Pin	Signal
1	Return	3	Hard disk
2	Hard disk active	4	Return

SCSI Connectors

The two SCSI connectors on the system board are 68-pin wide/fast connectors.

Figure 4-6. SCSI Connector

34   1

68   35   OM04377

Pin	Signal	Pin	Signal
1–16	GND	49–50	GND
17	TERMPWR	51	TERMPWR
18	TERMPWR	52	TERMPWR
19	RESERVED	53	RESERVED
20–34	GND	54	GND
35	DB 12_L	55	ATN_L
36	DB 13_L	56	GND
37	DB 14_L	57	BSY_L
38	DB 15_L	58	ACK_L
39	DB P1_L	59	RST_L
40	DB 0_L	60	MSG_L
41	DB 1_L	61	SEL_L
42	DB 2_L	62	CD_L
43	DB 3_L	63	REQ_L
44	DB 4_L	64	I/O_L
45	DB 5_L	65	DB 8_L
46	DB 6_L	66	DB 9_L
47	DB 7_L	67	DB 10_L
48	DB P_L	68	DB 11_L
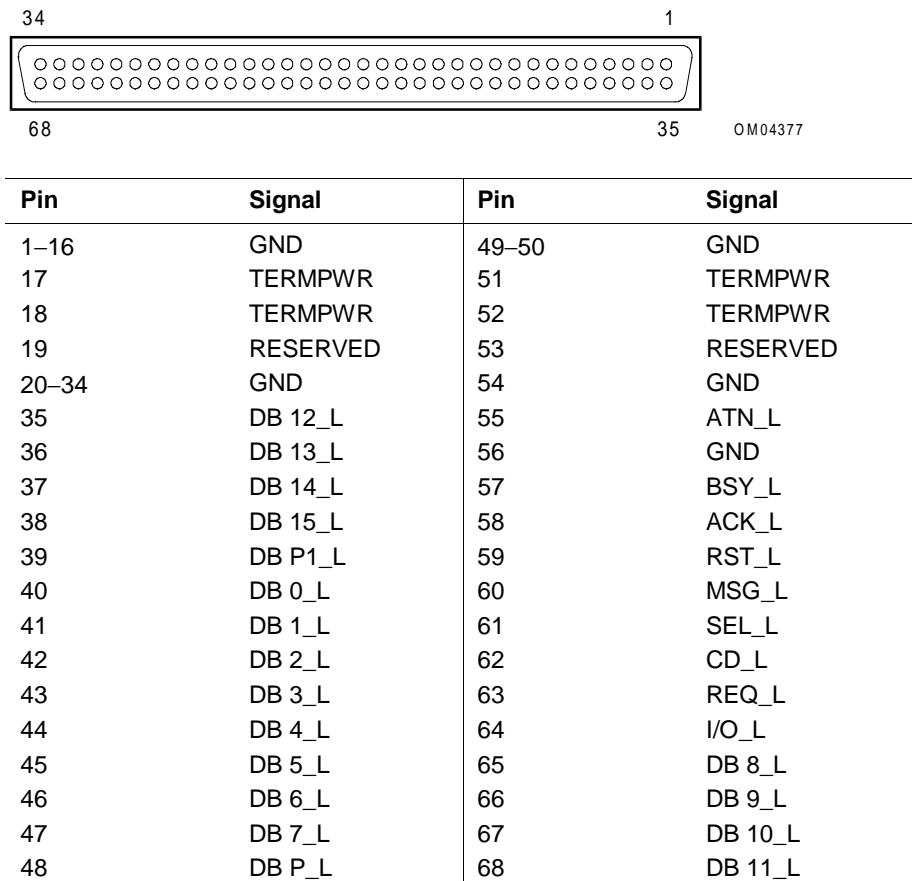
IDE Connectors

If no IDE drives are present, no IDE cable should be connected. If only one IDE drive is installed, it must be connected at the end of the cable.

Pin	Signal	Pin	Signal
1	RESET_L	21	IDEDRQ
2	GND	22	GND
3	DD7	23	DIOW_L
4	DD8	24	GND
5	DD6	25	DIOR_L
6	DD9	26	GND
7	DD5	27	IORDY
8	DD10	28	CSEL (1 KΩ p/d)
9	DD4	29	IDEDAK_L
10	DD11	30	GND
11	DD3	31	IDEIRQ
12	DD12	32	Reserved (N/C)
13	DD2	33	IDESA1
14	DD13	34	PDIAG_L (tied to GND)
15	DD1	35	IDESA0
16	DD14	36	IDESA2
17	DD0	37	IDECS1_L
18	DD15	38	IDECS3_L
19	GND	39	IDEHDACT_L
20	Keyed	40	GND

ISA Connector

The system board ISA connector follows the standard pin-out given in the ISA Specification.

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	IOCHK_L	B1	GND	C1	SBHE_L	D1	MEMCS1
A2	SD7	B2	RESET	C2	LA23	D2	IOCS16_L
A3	SD6	B3	+5V	C3	LA22	D3	IRQ10
A4	SD5	B4	IRQ9	C4	LA21	D4	IRQ11
A5	SD4	B5	-5V	C5	LA20	D5	IRQ12
A6	SD3	B6	DRQ2	C6	LA19	D6	IRQ15
A7	SD2	B7	-12V	C7	LA18	D7	IRQ14
A8	SD1	B8	SRDY_L	C8	LA17	D8	DACK0_L
A9	SD0	B9	+12V	C9	MEMR_L	D9	DRQ0
A10	IOCHRDY	B10	GND	C10	MEMW_L	D10	DACK5_L
A11	AEN	B11	SMEMW_L	C11	SD8	D11	DRQ5
A12	SA19	B12	SMEMR_L	C12	SD9	D12	DACK6_L
A13	SA18	B13	IOW_L	C13	SD10	D13	DRQ6
A14	SA17	B14	IOR_L	C14	SD11	D14	DACK7_L
A15	SA16	B15	DACK3_L	C15	SD12	D15	DRQ7
A16	SA15	B16	DRQ3	C16	SD13	D16	+5V
A17	SA14	B17	DACK1_L	C17	SD14	D17	MASTER1
A18	SA13	B18	DRQ1	C18	SD15	D18	GND
A19	SA12	B19	REFRESH_L				
A20	SA11	B20	BCLK				
A21	SA10	B21	IRQ7				
A22	SA9	B22	IRQ6				
A23	SA8	B23	IRQ5				
A24	SA7	B24	IRQ4				
A25	SA6	B25	IRQ3				
A26	SA5	B26	DACK2_L				
A27	SA4	B27	TC				
A28	SA3	B28	BALE				
A29	SA2	B29	+5V				
A30	SA1	B30	OSC				
A31	SA0	B31	GND				

PCI Connector

Pin	Signal	Pin	Signal
A1	TRST_L	B1	−12 V
A2	+12 V	B2	TCK
A3	TMS	B3	GND
A4	TDI	B4	TD0
A5	+5 V	B5	+5 V
A6	INTA_L	B6	+5 V
A7	INTC_L	B7	INTB_L
A8	+5 V	B8	INTD_L
A9	Reserved	B9	PRSNT1_L
A10	+5 V	B10	Reserved
A11	Reserved	B11	PRSNT2_L
A12	GND	B12	GND
A13	GND	B13	GND
A14	Reserved	B14	Reserved
A15	RST_L	B15	GND
A16	+5 V	B16	CLK
A17	GNT	B17	GND
A18	GND	B18	REQ_L
A19	Reserved	B19	+5 V
A20	AD30	B20	AD31
A21	+3.3 V *	B21	AD29
A22	AD28	B22	GND
A23	AD26	B23	AD27
A24	GND	B24	AD25
A25	AD24	B25	+3.3 V *
A26	IDSEL	B26	C-BE3_L
A27	+3.3 V *	B27	AD23
A28	AD22	B28	GND
A29	AD20	B29	AD21
A30	GND	B30	AD19
A31	AD18	B31	+3.3 V *
A32	AD16	B32	AD17
A33	+3.3 V *	B33	C-BE2_L
A34	FRAME_L	B34	GND
A35	GND	B35	IRDY_L

Pin	Signal	Pin	Signal
A36	TRDY_L	B36	+3.3 V *
A37	GND	B37	DEVSEL_L
A38	STOP_L	B38	GND
A39	+3.3 V *	B39	LOCK_L
A40	SDONE	B40	PERR_L
A41	SBO_L	B41	+3.3 V *
A43	PAR	B43	+3.3 V *
A44	AD15	B44	C-BE1_L
A45	+3.3 V *	B45	AD14
A46	AD13	B46	GND
A47	AD11	B47	AD12
A48	GND	B48	AD10
A49	AD9	B49	GND
A50	KEY	B50	KEY
A51	KEY	B51	KEY
A52	C-BE0_L	B52	AD8
A53	+3.3 V *	B53	AD7
A54	AD6	B54	+3.3 V *
A55	AD4	B55	AD5
A56	GND	B56	AD3
A57	AD2	B57	GND
A58	AD0	B58	AD1
A59	+5 V	B59	+5 V
A60	REQ64_L	B60	ACK64_L
A61	+5 V	B61	+5 V
A62	+5 V	B62	+5 V

*The system board does not provide a PCI 3.3 V power connector. Only the 5 V PCI signaling environment is supported, and no power is available at the 3.3 V signal pins in the PCI expansion slots.

System I/O Addresses

The following table shows the location in I/O space of all registers that are directly I/O-accessible.

Address(es)	Resource	Device	Notes
0000h - 000Fh	DMA Controller 1	PIIX4	
0010h - 001Fh	DMA Controller 1	PIIX4	Aliased from 0000h - 000Fh
0020h - 0021h	Interrupt Controller 1	PIIX4	
0022h - 0023h			
0024h - 0025h	Interrupt Controller 1	PIIX4	Aliased from 0020h - 0021h
0026h - 0027h			
0028h - 0029h	Interrupt Controller 1	PIIX4	Aliased from 0020h - 0021h
002Ah - 002Bh			
002Ch - 002Dh	Interrupt Controller 1	PIIX4	Aliased from 0020h - 0021h
002Eh - 002Fh	Super I/O index and data ports		
0030h - 0031h	Interrupt Controller 1	PIIX4	Aliased from 0020h - 0021h
0032h - 0033h			
0034h - 0035h	Interrupt Controller 1	PIIX4	Aliased from 0020h - 0021h
0036h - 0037h			
0038h - 0039h	Interrupt Controller 1	PIIX4	Aliased from 0020h - 0021h
003Ah - 003Bh			
003Ch - 003Dh	Interrupt Controller 1	PIIX4	Aliased from 0020h - 0021h
003Eh - 003Fh			
0040h - 0043h	Programmable timers	PIIX4	
0044h - 004Fh			
0050h - 0053h	Programmable timers	PIIX4	Aliased from 0040h - 0043h
0054h - 005Fh			
0060h, 0064h	Keyboard controller		Keyboard chip select from the 87307 super I/O controller
0061h	NMI status & control register	PIIX4	
0063h	NMI status & control register	PIIX4	Aliased
0065h	NMI status & control register	PIIX4	Aliased
0067h	NMI status & control register	PIIX4	Aliased
0070h	NMI mask (bit 7) & RTC address (bits 6::0)	PIIX4	
0072h	NMI mask (bit 7) & RTC address (bits 6::0)	PIIX4	Aliased from 0070h
0074h	NMI mask (bit 7) & RTC address (bits 6::0)	PIIX4	Aliased from 0070h
0076h	NMI mask (bit 7) & RTC address (bits 6::0)	PIIX4	Aliased from 0070h

Address(es)	Resource	Device	Notes
0071h	RTC data	PIIX4	
0073h	RTC data	PIIX4	Aliased from 0071h
0075h	RTC data	PIIX4	Aliased from 0071h
0077h	RTC data	PIIX4	Aliased from 0071h
0080h - 0081h	BIOS timer		
0080h - 008Fh	DMA low page register	PIIX4	
0090h - 0091h	DMA low page register	PIIX4	Aliased
0092h	System Control Port A (PC-AT control port)	PIIX4	Not aliased in DMA range
0093h - 009Fh	DMA low page register	PIIX4	Aliased
0094h	Video controller		
00A0h - 00A1h	Interrupt Controller 2	PIIX4	
00A4h - 00A15	Interrupt Controller 2	PIIX4	Aliased
00A8h - 00A19	Interrupt Controller 2	PIIX4	Aliased
00ACh - 00ADh	Interrupt Controller 2	PIIX4	Aliased
00B0h - 00B1h	Interrupt Controller 2	PIIX4	Aliased
00B2h	Advanced Power Management control	PIIX4	
00B3h	Advanced Power Management status	PIIX4	
00B4h - 00B5h	Interrupt Controller 2	PIIX4	Aliased
00B8h - 00B9h	Interrupt Controller 2	PIIX4	Aliased
00BCh - 00BDh	Interrupt Controller 2	PIIX4	Aliased
00C0h - 00DFh	DMA Controller 2	PIIX4	
00F0h	Clear NPX error		Resets IRQ13
00F8h - 00FFh	x87 numeric coprocessor		
0102h	Video controller		
0170h - 0177h	Secondary fixed disk controller (IDE)	PIIX4	Not used
01F0h - 01F7h	Primary fixed disk controller (IDE)	PIIX4	
0200h - 0207h	Game I/O port		Not used
0220h - 022Fh	Serial Port A		
0238h - 023Fh	Serial Port B		
0278h - 027Fh	Parallel Port 3		
02E8h - 02EFh	Serial Port B		
02F8h - 02FFh	Serial Port B		
0338h - 033Fh	Serial Port B		
0370h - 0375h	Secondary diskette		
0376h	Secondary IDE		

Address(es)	Resource	Device	Notes
0377h	Secondary IDE/diskette		
0378h - 037Fh	Parallel Port 2		
03B4h - 03BAh	Monochrome display port		
03BCh - 03BFh	Parallel Port 1 (primary)		
03C0h - 03CFh	Video controller		
03D4h - 03DAh	Color graphics controller		
03E8h - 03EFh	Serial Port A		
03F0h - 03F5h	Diskette controller		
03F6h - 03F7h	Primary IDE/secondary diskette		
03F8h - 03FFh	Serial Port A (primary)		
0400h - 043Fh	DMA Controller 1, extended mode registers	PIIX4	
0461h	Extended NMI/reset control	PIIX4	
0462h	Software NMI	PIIX4	
0480h - 048Fh	DMA high page register	PIIX4	
04C0h - 04CFh	DMA Controller 2, high base register		
04D0h - 04D1h	Interrupt Controllers 1 and 2 control register		
04D4h - 04D7h	DMA Controller 2, extended mode register		
04D8h - 04DFh	Reserved		
04E0h - 04FFh	DMA channel stop registers		
0678h - 067Ah	Parallel port (ECP)		
0778h - 077Ah	Parallel port (ECP)		
07BCh - 07BEh	Parallel port (ECP)		
0800h - 08FFh	NVRAM		
0C80h - 0C83h	EISA system identifier registers	PIIX4	
0C84h	Board revision register		
0C85h - 0C86h	BIOS function control		
0CA9h	DISMIC data register		Server management mailbox
0CAAh	DISMIC control/status register		registers
0CABh	DISMIC flags register		
0CF8h	PCI CONFIG_ADDRESS register		Located in PAC
0CF9h	PAC turbo and reset control	PIIX4	
0CFCh	PCI CONFIG_DATA register		Located in PAC
46E8h	Video controller		
xx00 - xx1F*	SCSI registers		Refer to SCSI chip documentation

*SCSI I/O base address is set using configuration registers.

Memory Addresses

DOS Compatibility Region

The DOS compatibility region covers 1 MB of memory from addresses 0000_0000h to 0FFFFF.

Address Range (hex)	Amount	Function
0 to 07FFFFh	512 KB	DOS region, base system memory (fixed)
080000h to 09FFFFh	128 KB	ISA window memory
0A0000h to 0BFFFFh	128 KB	Video or SMM memory
0C0000h and 0DFFFFh	128 KB	Expansion board BIOS and buffer area
0E0000h to 0EFFFFh	64 KB	Extended system BIOS
0F0000h to 0FFFFFh	64 KB	System BIOS

Extended Memory Region

Address space greater than 1 MB is defined as Extended Memory on the system board. The supported maximum memory configuration is limited to 2 GB, as shown in the following table.

Address Range (hex)	Amount	Function
0100000h to 7FFFFFFFh	2 GB	Local DRAM space

Interrupts

The following table recommends the logical interrupt mapping of interrupt sources. It reflects a typical configuration; However, the user can change these interrupts. The information is used to determine how to program each interrupt. The actual interrupt map is defined using configuration registers in the PIIX4 and the I/O controller. I/O redirection registers in the I/O APIC are provided for each interrupt signal, which define hardware interrupt signal characteristics for APIC messages sent to local APIC(s).

Interrupt	I/O APIC Level	Description
INTR	INT0	Processor interrupt
NMI	N/A	NMI from BUD to processor
IRQ0	INT2	Timer interrupt from PIIX4
IRQ1	INT1	Keyboard interrupt
IRQ2	N/A	Interrupt signal from second 8259 internal to PIIX4
IRQ3	INT3	Serial port A or B interrupt from 87309VUL device (user-configurable)
IRQ4	INT4	Serial port A or B interrupt from 87309VUL device (user-configurable)
IRQ5	INT5	
IRQ6	INT6	Diskette
IRQ7	INT7	Parallel port
IRQ8_L	INT8	RTC interrupt
IRQ9	INT9	
IRQ10	INT10	
IRQ11	INT11	
IRQ12	INT12	Mouse interrupt
N/A	INT13	
IRQ14	INT14	Compatibility IDE interrupt from primary channel IDE devices 0 and 1
IRQ15	INT15	Secondary IDE interrupt
P_INTA_L	INT16	PCI interrupt signal A
P_INTB_L	INT17	PCI interrupt signal B
P_INTC_L	INT18	PCI interrupt signal C
P_INTD_L	INT19	PCI interrupt signal D
SMI_L	N/A	System management interrupt – general purpose error indicator; controlled by BUD

Video Modes

The 5446 integrated video controller provides all standard IBM VGA modes. With 2 MB of video memory, the system goes beyond standard VGA support. The following tables show all supported video modes using 1 MB of video memory. They also show the standard modes the chip supports, including the number of colors and palette size, resolution, pixel frequency, and scan frequencies.

Standard VGA Modes

Mode(s) in Hex	Colors (no. per palette size)	Resolution	Pixel Freq. (MHz)	Horiz. Freq. (kHz)	Vert. Freq. (Hz)
0, 1	16/256K	360 X 400	14	31.5	70
2, 3	16/256K	720 X 400	28	31.5	70
4, 5	4/256K	320 X 200	12.5	31.5	70
6	2/256K	640 X 200	25	31.5	70
7	Mono	720 X 400	28	31.5	70
D	16/256K	320 X 200	12.5	31.5	70
E	16/256K	640 X 200	25	31.5	70
F	Mono	640 X 350	25	31.5	70
10	16/256K	640 X 350	25	31.5	70
11	2/256K	640 X 480	25	31.5	60
12	16/256K	640 X 480	25	31.5	60
12+	16/256K	640 X 480	31.5	37.5	75
13	256/256K	320 X 200	12.5	31.5	70

Extended VGA Modes

Mode(s) in Hex	Colors (no per palette size)	Resolution	Pixel Freq. (MHz)	Horiz. Freq. (kHz)	Vert. Freq. (Hz)
58, 6A	16/256K	800 X 600	36	35.2	56
58, 6A	16/256K	800 X 600	40	37.8	60
58, 6A	16/256K	800 X 600	50	48.1	72
58, 6A	16/256K	800 X 600	49.5	46.9	75
5C	256/256K	800 X 600	36	35.2	56
5C	256/256K	800 X 600	40	37.9	60
5C	16/256K	800 X 600	50	48.1	72
5C	256/256K	800 X 600	49.5	46.9	75
5C	256/256K	800 X 600	56.25	53.7	85
5C	256/256K	800 X 600	68.2	63.6	100

Mode(s) in Hex	Colors (no per palette size)	Resolution	Pixel Freq. (MHz)	Horiz. Freq. (kHz)	Vert. Freq. (Hz)
5D	16/256K (interlaced)	1024 X 768	44.9	35.5	87
5D	16/256K	1024 X 768	65	48.3	60
5D	16/256K	1024 X 768	75	56	70
5D	16/256K	1024 X 768	78.7	60	75
5E	256/256K	640 X 480	25	31.5	70
5F	256/256K	640 X 480	25	31.5	60
5F	256/256K	640 X 480	31.5	37.9	72
5F	256/256K	640 X 480	31.5	37.5	75
5F	256/256K	640 X 480	36	43.3	85
5F	256/256K	640 X 480	43.2	50.9	100
60	256/256K (interlaced)	1024 X 768	44.9	35.5	43
60	256/256K	1024 X 768	65	48.3	60
60	256/256K	1024 X 768	75	56	70
60	256/256K	1024 X 768	78.7	60	75
60	256/256K	1024 X 768	94.5	68.3	85
60	256/256K	1024 X 768	113.3	81.4	100
64	64K	640 X 480	25	31.5	60
64	64K	640 X 480	31.5	37.9	72
64	64K	640 X 480	31.5	37.5	75
64	64K	640 X 480	36	43.3	85
64	64K	640 X 480	43.2	50.9	100
65	64K	800 X 600	36	35.2	56
65	64K	800 X 600	40	37.8	60
65	64K	800 X 600	50	48.1	72
65	64K	800 X 600	49.5	46.9	75
65	64K	800 X 600	49.5	46.9	75
65	64K	800 X 600	56.25	53.7	85
65	64K	800 X 600	68.2	63.6	100
66	32K	640 X 480	25	31.5	60
66	32K	640 X 480	31.5	37.9	72
66	32K	640 X 480	31.5	37.5	75
66	32K	640 X 480	36	43.3	85
66	32K	640 X 480	43.2	50.9	100
67	32K	800 X 600	36	35.2	56
67	32K	800 X 600	40	37.8	60
67	32K	800 X 600	50	48.1	72

Mode(s) in Hex	Colors (no per palette size)	Resolution	Pixel Freq. (MHz)	Horiz. Freq. (kHz)	Vert. Freq. (Hz)
67	32K	800 X 600	49.5	46.9	75
67	32K	800 X 600	56.25	53.7	85
67	32K	800 X 600	68.2	63.6	100
68	32K (interlaced)	1024 X 768	44.9	35.5	43
68	32K	1024 X 768	65	48.3	60
68	32K	1024 X 768	75	56	70
68	32K	1024 X 768	78.7	60	75
68	32K	1024 X 768	94.5	68.3	85
68	32K	800 X 600	113.3	81.4	100
6C	16/256K (interlaced)	1280 X 1024	75	48	87
6D	16/256K (interlaced)	1280 X 1024	75	48	87
6D	16/256K (interlaced)	1280 X 1024	108	65	60
6D	16/256K (interlaced)	1280 X 1024	135	80	75
6D	16/256K (interlaced)	1280 X 1024	157.5	91	85
6E	32K	1152 x 864	94.5	63.9	70
6E	32K	1152 x 864	108	67.5	75
6E	32K	1152 x 864	121.5	76.7	85
6E	32K	1152 x 864	143.5	91.5	100
71	16M	640 x 480	25	31.5	60
71	16M	640 X 480	31.5	37.9	72
71	16M	640 X 480	31.5	37.5	75
71	16M	640 X 480	36	43.3	85
71	16M	640 X 480	43.2	50.9	100
74	64K (interlaced)	1024 X 768	44.9	35.5	43
74	64K	1024 X 768	65	48.3	60
74	64K	1024 X 768	75	56	70
74	64K	1024 X 768	78.7	60	75
74	64K	1024 X 768	94.5	68.3	85
74	64K	800 X 600	113.3	81.4	100
78	32K	800 X 600	36	35.2	56
78	16M	800 X 600	40	37.8	60
78	16M	800 X 600	50	48.1	72
78	16M	800 X 600	49.5	46.9	75
78	16M	800 X 600	56.25	53.7	85

Mode(s) in Hex	Colors (no per palette size)	Resolution	Pixel Freq. (MHz)	Horiz. Freq. (kHz)	Vert. Freq. (Hz)
78	16M	800 X 600	68.2	63.6	100
78	16M	800 X 600	56.25	53.7	85
78	16M	800 X 600	68.2	63.6	100
7B	256/256K (interlaced)	1600 x 1200	135	62.5	48
7B	256/256K (interlaced)	1600 x 1200	162	75	60
7C	256/256K (interlaced)	1152 x 864	94.5	63.9	70
7C	256/256K (interlaced)	1152 x 864	108	67.5	75
7C	256/256K (interlaced)	1152 x 864	121.5	76.7	85
7C	256/256K (interlaced)	1152 x 864	143.5	91.5	100
7D	64K	1152 x 864	94.5	63.9	70
7D	64K	1152 x 864	108	67.5	75
7D	64K	1152 x 864	121.5	76.7	85
7D	64K	1152 x 864	143.5	91.5	100

Regulatory Specifications

This appendix contains the following:

- Declaration of Compliance
- Safety Compliances
- Electromagnetic Compatibility (EMC)
- Electromagnetic Compatibility Notice (USA)
- Electromagnetic Compatibility Notices (International)

Declaration of Compliance

We hereby certify that this product is in compliance with European Union EMC Directive 89/336/EEC, using standards EN55022 (Class A) and EN50082-1.

Safety Compliances

USA:	UL listed to1950, 3rd Edition
Canada:	UL certified to CSA C22.2 No. 950-95 for Canada
Europe:	CE Mark 73/23/EEC

Electromagnetic Compatibility (EMC)

USA:	FCC 47 Class A CFR Parts 2 and 15, Tested Class A
Canada:	IC ICES-003 Class A
Europe:	EN55022, Class A EN50082-1 　　EN61000-4-2 ESD Susceptibility 　　EN61000-4-3 Radiated Immunity 　　EN61000-4-4 Electrical Fast Transient
International:	CISPR 22/93, Class A

Electromagnetic Compatibility Notice (USA)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on; the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the equipment. The customer is responsible for ensuring compliance of the modified product.

Only peripherals (computer input/output devices, terminals, printers, etc.) that comply with FCC Class A limits may be attached to this computer product. Operation with noncompliant peripherals is likely to result in interference to radio and TV reception.

All cables used to connect to peripherals must be shielded and grounded. Operation with cables, connected to peripherals, that are not shielded and grounded may result in interference to radio and TV reception.

Note: A Class A device installed within a residential area is likely to cause harmful interference.

Electromagnetic Compatibility Notices (International)

When used near a radio or TV receiver, it may become the cause of radio interference.

Read the instructions for correct handling.

This equipment has been tested for radio frequency emissions and has been verified to meet CISPR 22 Class A.

Cet appareil numérique respecte les limites bruits radioélectriques applicables aux appareils numériques de Classe A prescrites dans la norme sur le matériel brouilleur: "Appareils Numériques", NMB-003 édictée par le Ministre Canadian des Communications.

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the interference-causing equipment standard entitled "Digital Apparatus", ICES-003 of the Canadian Department of Communications.

Documentation of product compliance is on file with Solectron, 2715 Banny Jones Avenue, West Columbia, SC 29170.

Safety Guidelines, Warnings, and Cautions

Refer to the following safety guidelines, warnings, and cautions when servicing your system.

Safety Guidelines and Warnings
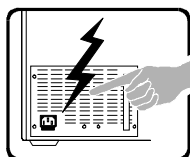
There are no user-serviceable parts inside the power supply. Servicing should be done by technically qualified personnel only. There may be more than one power supply in this product.

Hazardous voltage, current, and energy levels are present inside the power supply and the power distribution backplane.
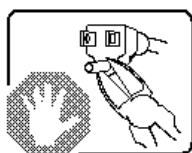
Do not attempt to modify or use the supplied AC power cord if it is not the exact type required.
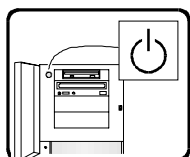
The push-button power switch on the front panel of the system DOES NOT turn off the system AC power. To remove AC power from the system, you must unplug the AC power cord from the system or the wall outlet.
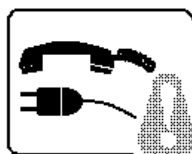
Hazardous electrical conditions may be present on power, telephone, and communication cables. Turn off the system and disconnect the AC power cord, telecommunications systems, networks, and modems attached to the system before opening it. Otherwise, personal injury or equipment damage can result.

SAFETY STEPS: Whenever you remove the side and/or front covers to access the Inside of the system, follow these steps:

Turn off all peripheral devices connected to the system.

Turn off the system by pressing the push-button power switch on the front of the system.

Unplug the AC power cord from the system or the wall outlet.

Label and disconnect all cables connected to I/O connectors or ports on the back of the system.

Provide some electrostatic discharge (ESD) protection by wearing an anti-static wrist strap attached to the chassis ground—any unpainted metal surface on the system—when handling components.

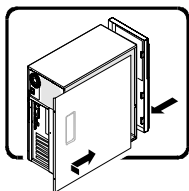Do not operate the system with the side and/or front covers removed.
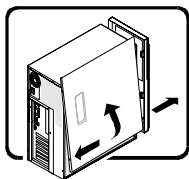
After you have completed the six SAFETY steps above, you can remove the front and/or side covers. To do this:

Unlock and remove the padlock from the back of the system if a padlock has been installed.

Remove and save all the screws from the covers.

Remove the covers.

For proper cooling and airflow, always reinstall the side and front covers before turning on the system. Operating the system without the covers in place can damage system parts. To install the covers:

Check first to make sure that you have not left any tools or loose parts inside the system.

Check that cables, expansion boards, and other components are properly installed.

Attach the covers to the chassis with the screws removed earlier, and tighten them firmly.

Insert and lock a padlock to the system cabinet to prevent unauthorized access inside the system.

Connect all external cables and the AC power cord to the system.
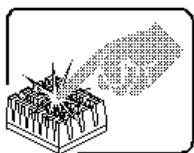
A processor and its heat sink may be hot if the system has been running. Also, there may be sharp pins and edges on some board and chassis parts. Contact should be made with care. Consider wearing protective gloves.
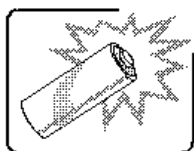
There is danger of an explosion if the battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the equipment manufacturer. Dispose of used batteries according to the manufacturer's instructions.
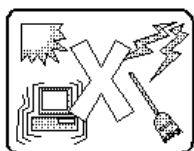
The system is designed to operate in a typical office environment. Choose a site that is:

Clean and free of airborne particles (other than normal room dust).

Well-ventilated and away from sources of heat, including direct sunlight.

Away from sources of vibration or physical shock.

Isolated from strong electromagnetic fields produced by electrical devices.

Provided with a properly grounded AC wall outlet.

Provided with sufficient space to access the power supply cords, because they serve as the system's main power disconnect.

In regions that are susceptible to electrical storms, we recommend you plug your system into a surge suppressor and disconnect telecommunication lines to your modem during an electrical storm.

Cautions

Electrostatic Discharge (ESD)and ESD Protection	ESD can damage disk drives, boards, and other components. This system can withstand normal levels of environmental ESD while you are hot-swapping SCSI hard disk drives and power supplies. However, we recommend that you perform all procedures in this manual only at an ESD workstation. If one is not available, you can provide some ESD protection by wearing an anti-static wrist strap attached to the chassis ground—any unpainted metal surface on the system—when handling components.
Handling Boards and Modules	Boards and modules can be extremely sensitive to ESD and always require careful handling. After removing a board or module from its protective wrapper or from the system, place the board or module component-side UP on a grounded, static-free surface. If you place the system board on a conductive surface, the battery leads may short out. If they do, the battery charge is drained, resulting in a loss of CMOS data. Do not slide any boards or modules across any surfaces.
Cooling and Airflow	Operating the system with the side and front covers removed can damage the components inside it. For proper cooling and airflow, always replace the covers before turning on the system.
Battery	There is danger of an explosion if the battery is incorrectly replaced. Replace it only with the same or equivalent type recommended by the equipment manufacturer. Dispose of the used battery according to the manufacturer's instructions.

Cautions

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